

# 1

# Personal Finance Basics and the Time Value of Money

## Objectives

1. Analyze the process for making personal financial decisions.
2. Develop personal financial goals.
3. Assess personal and economic factors that influence personal financial planning.
4. Calculate time value of money situations associated with personal financial decisions.
5. Identify strategies for achieving personal financial goals for different life situations.

## What will this mean for me?

Uncertain economic times intensify the importance of wise personal financial decisions. Each year, more than a million people declare bankruptcy, and Americans lose more than a billion dollars in fraudulent investments. Both of these common difficulties result from poor personal financial planning and incomplete information. Your ability to make wise money decisions is the basis for your current and long-term well-being.

New image  
come



## My Life

### HOW DO I START?

One day, you may receive news that your aunt has given you a gift of \$10,000. Or you might find yourself with an extensive amount of credit card debt. Or maybe you desire to contribute money to a homeless shelter or a hunger-relief organization.

Each of these situations involves financial decision making that requires, first, planning, and then, taking action. The process you use should be carefully considered so no (or only a few) surprises occur.

The main focus when making decisions is to avoid financial difficulties and legal tangles. How will you best plan for using your finances? For each of the following statements, select "yes," "no," or "uncertain" to indicate your personal response regarding these financial planning activities.

- |   |     |    |           |
|---|-----|----|-----------|
| 1. When making major financial decisions, I research them using a variety of information sources. | Yes | No | Uncertain |
| 2. My specific financial goals for the next year are written down.                                | Yes | No | Uncertain |
| 3. My family and household situation is likely to stay fairly stable over the next year or two.   | Yes | No | Uncertain |
| 4. Time value of money calculations often guide my saving and spending decisions.                 | Yes | No | Uncertain |
| 5. I am able to name specific types of risks that can affect my personal financial decisions.     | Yes | No | Uncertain |

As you study this chapter, you will encounter "My Life" boxes with additional information and resources related to these items.

# The Financial Planning Process

## Objective 1

Analyze the process for making personal financial decisions.

**personal financial planning** The process of managing your money to achieve personal economic satisfaction.

Being “rich” means different things to different people. Some define wealth as owning many expensive possessions and a high income. People may associate being rich with not having to worry about finances or being able to pay bills. For others, being rich means they are able to contribute to organizations that matter to them.

How people get rich also varies. Starting a successful business or pursuing a high-paying career are common paths to wealth. However, frugal living and wise investing can also result in long-term financial security. In recent years, many have discovered that the quality of their lives should be measured in terms of something other than money and material items. A renewed emphasis on family, friends, and serving others has surfaced.

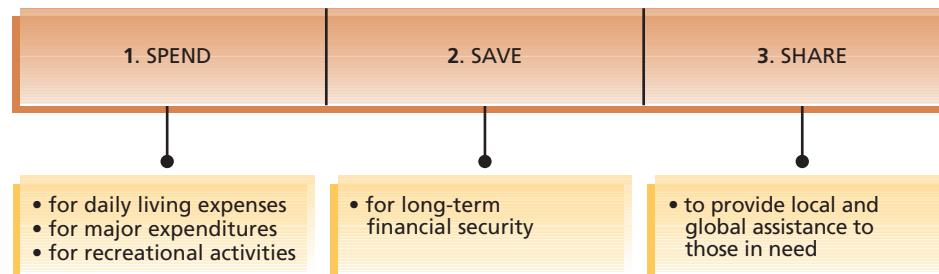
Most individuals would like to handle their finances so that they get full satisfaction from each available dollar. To achieve this and other financial goals, people first need to identify and set priorities. Both financial and personal satisfaction are the result of an organized process that is commonly referred to as *personal money management* or *personal financial planning*.

**Personal financial planning** is the process of managing your money to achieve personal economic satisfaction. This planning process allows you to control your financial situation. Every person, family, or household has a unique financial position, and any financial activity therefore must also be carefully planned to meet specific needs and goals.

A comprehensive financial plan can enhance the quality of your life and increase your satisfaction by reducing uncertainty about your future needs and resources. The specific advantages of personal financial planning include

- Increased effectiveness in obtaining, using, and protecting your financial resources throughout your lifetime.
- Increased control of your financial affairs by avoiding excessive debt, bankruptcy, and dependence on others for economic security.
- Improved personal relationships resulting from well-planned and effectively communicated financial decisions.
- A sense of freedom from financial worries obtained by looking to the future, anticipating expenses, and achieving your personal economic goals.

We all make hundreds of decisions each day. Most of these decisions are quite simple and have few consequences. Some are complex and have long-term effects on our personal and financial situations. Personal financial activities involve three main decision areas:





### Exhibit 1-1

The financial planning process

While everyone makes decisions, few people consider how to make better decisions. As Exhibit 1-1 shows, the financial planning process is a logical, six-step procedure that can be adapted to any life situation.

## STEP 1: DETERMINE YOUR CURRENT FINANCIAL SITUATION

In this first step, you will determine your current financial situation regarding income, savings, living expenses, and debts. Preparing a list of current asset and debt balances and amounts spent for various items gives you a foundation for financial planning activities. The personal financial statements discussed in Chapter 3 will provide the information needed to match your goals with your current income and potential earning power.

**Step 1 Example** Within the next two months, Kent Mullins will complete his undergraduate studies with a major in international studies. He has worked part-time in various sales jobs. He has a small savings fund (\$1,700) and over \$8,500 in student loans. What additional information should Kent have available when planning his personal finances?

*How about you? Depending on your current (or future) life situation, what actions might you take to determine your current financial situation?*

## STEP 2: DEVELOP YOUR FINANCIAL GOALS

Several times a year, you should analyze your financial values and goals. This activity involves identifying how you feel about money and why you feel that way. Are your feelings about money based on factual knowledge or on the influence of others? Are your financial priorities based on social pressures, household needs, or desires for luxury items? How will economic conditions affect your goals and priorities? The purpose of this analysis is to differentiate your needs from your wants.

Specific financial goals are vital to financial planning. Others can suggest financial goals for you; however, *you* must decide which goals to pursue. Your financial goals can range from spending all of your current income to developing an extensive savings and investment program for your future financial security.

**Step 2 Example** Kent Mullins has several goals, including paying off his student loans, obtaining an advanced degree in global business management, and working in Latin America for a multinational company. What other goals might be appropriate for Kent?

*How about you?* Depending on your current (or future) life situation, describe some short-term or long-term goals that might be appropriate for you.

## STEP 3: IDENTIFY ALTERNATIVE COURSES OF ACTION



*Financial choices require periodic evaluation.*

### DID YOU KNOW?

According to the National Endowment for Financial Education, 70 percent of major lottery winners end up with financial difficulties. These winners often squander the funds awarded them, while others overspend. Many end up declaring bankruptcy. Having more money does not automatically mean you will make better financial choices.

Developing alternatives is crucial when making decisions. Although many factors will influence the available alternatives, possible courses of action usually fall into these categories:

- *Continue the same course of action.* For example, you may determine that the amount you have saved each month is still appropriate.
- *Expand the current situation.* You may choose to save a larger amount each month.
- *Change the current situation.* You may decide to use a money market account instead of a regular savings account.
- *Take a new course of action.* You may decide to use your monthly savings budget to pay off credit card debts.

Not all of these categories will apply to every decision; however, they do represent possible courses of action. For example, if you want to stop working full time to go to school, you must generate several alternatives under the category “Take a new course of action.”

Creativity in decision making is vital to effective choices. Considering all of the possible alternatives will help you make more effective and satisfying decisions. For instance, most people believe they must own a car to get to work or school. However, they

should consider other alternatives such as public transportation, carpooling, renting a car, shared ownership of a car, or a company car.

Remember, when you decide not to take action, you elect to “do nothing,” which can be a dangerous alternative.

**Step 3 Example** Kent Mullins has several options available for the near future. He could work full time and save for graduate school; he could go to graduate school full time by taking out an additional loan; or he could go to school part time and work part time. What additional alternatives might he consider?

*How about you?* Depending on your current (or future) life situation, list various alternatives for achieving the financial goals you identified in the previous step.

## STEP 4: EVALUATE YOUR ALTERNATIVES

You need to evaluate possible courses of action, taking into consideration your life situation, personal values, and current economic conditions. How will the ages of dependents affect your saving goals? How do you like to spend leisure time? How will changes in interest rates affect your financial situation?

**CONSEQUENCES OF CHOICES** Every decision closes off alternatives. For example, a decision to invest in stock may mean you cannot take a vacation. A decision to go to school full time may mean you cannot work full time. **Opportunity cost** is what you give up by making a choice. This cost, commonly referred to as the trade-off of a decision, cannot always be measured in dollars. It may refer to the money you forgo by attending school rather than working, but it may also refer to the time you spend shopping around to compare brands for a major purchase.

In either case, the resources you give up (money or time) have a value that is lost.

Decision making will be an ongoing part of your personal and financial situation. Thus, you will need to consider the lost opportunities that will result from your decisions. Since decisions vary based on each person’s situation and values, opportunity costs will differ for each person.

**opportunity cost** What a person gives up by making a choice.

**EVALUATING RISK** Uncertainty is a part of every decision. Selecting a college major and choosing a career field involve risk. What if you don’t like working in this field or cannot obtain employment in it? Other decisions involve a very low degree of risk, such as putting money in an insured savings account or purchasing items that cost only a few dollars. Your chances of losing something of great value are low in these situations.

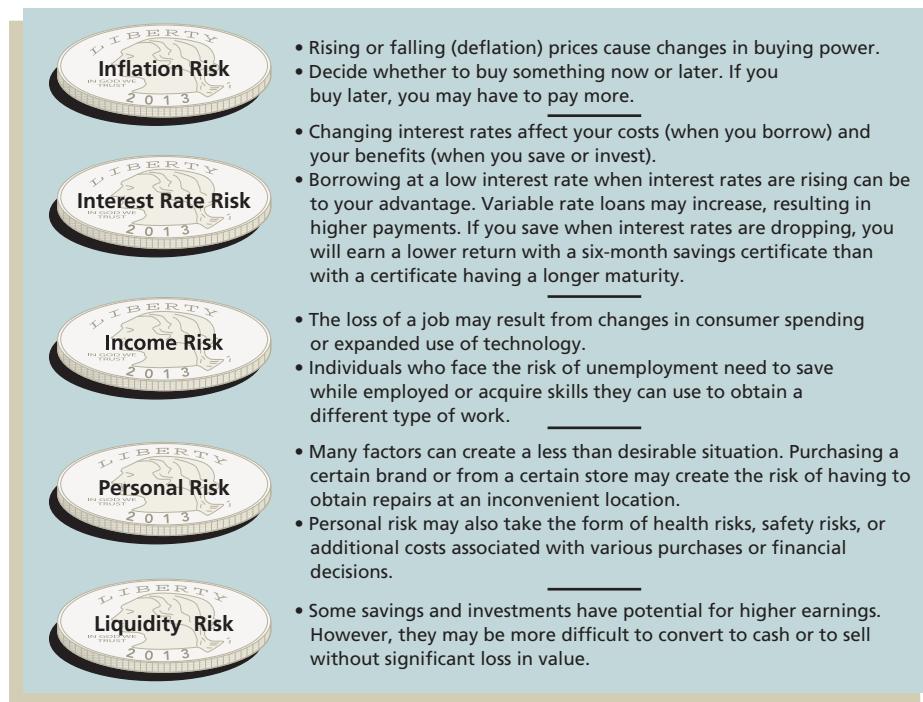
In many financial decisions, identifying and evaluating risk is difficult (see Exhibit 1-2). The best way to consider risk is to gather information based on your experience and the experiences of others and to use financial planning information sources.



*Various risks should be considered when making financial decisions.*

## Exhibit 1-2

### Types of risk



## My Life 1

When making major financial decisions, I research them using a variety of information sources.

Always consider information from several sources when making financial decisions. In addition to various Web sites, see Appendix A for other financial planning resources.

### FINANCIAL PLANNING INFORMATION SOURCES

When you travel, you often need a map. Traveling the path of financial planning requires a different kind of map. Relevant information is required at each stage of the decision-making process. This book provides the foundation you need to make appropriate personal financial planning decisions. Changing personal, social, and economic conditions will require that you continually supplement and update your knowledge. Exhibit 1-3 offers an overview of the informational resources available when making personal financial decisions.

**Step 4 Example** As Kent Mullins evaluates his alternative courses of action, he must consider his income needs for both the short term and the long term. He should also assess career opportunities with his current skills and his potential with advanced training. What risks and trade-offs should Kent consider?

*How about you?* Depending on your current (or future) life situation, what types of risks might you encounter in your various personal financial activities?

## STEP 5: CREATE AND IMPLEMENT YOUR FINANCIAL ACTION PLAN

This step of the financial planning process involves developing an action plan that identifies ways to achieve your goals. For example, you can increase your savings by reducing your spending or by increasing your income through extra time on the job. If you are concerned about year-end tax payments, you may increase the amount withheld from each paycheck, file quarterly tax payments, shelter current income in a tax-deferred

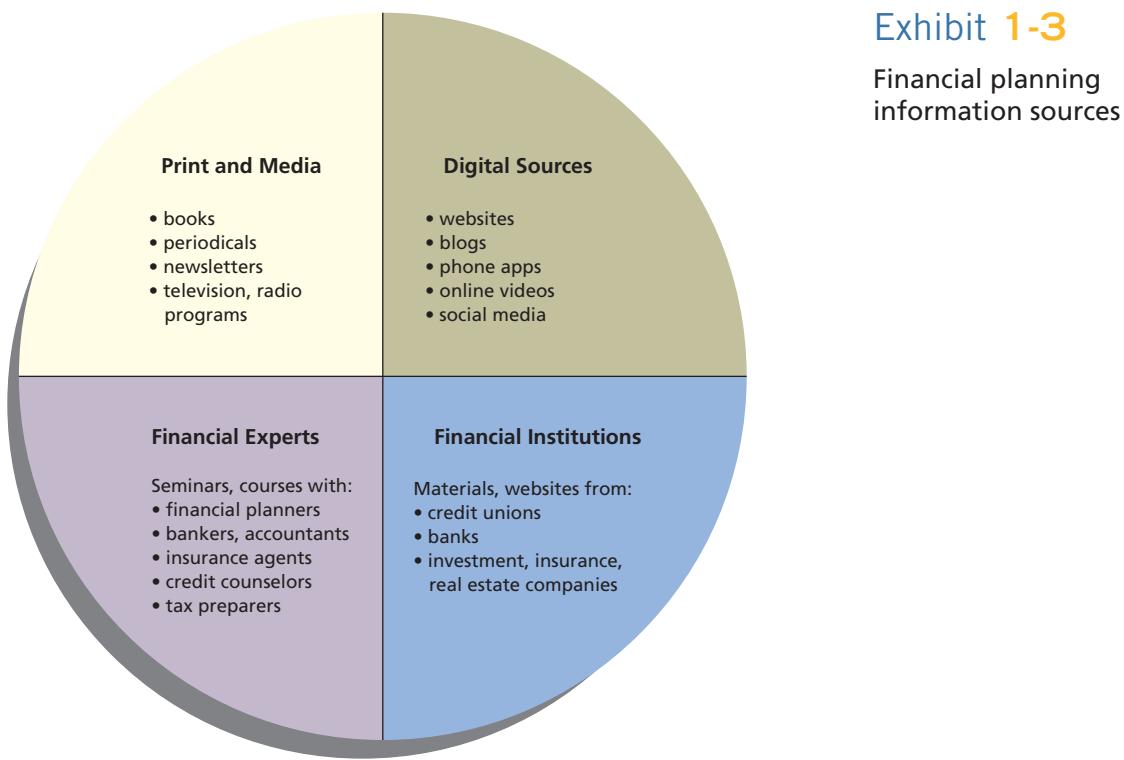


Exhibit 1-3

Financial planning information sources

retirement program, or buy municipal securities. As you achieve your short-term or immediate goals, the goals next in priority will come into focus.

To implement your financial action plan, you may need assistance from others. For example, you may use the services of an insurance agent to purchase property insurance or the services of an investment broker to purchase stocks, bonds, or mutual funds.

**Step 5 Example** Kent Mullins has decided to work full time for a few years while he (1) pays off his student loans, (2) saves money for graduate school, and (3) takes a couple of courses in the evening and on weekends. What are the benefits and drawbacks of this choice?

*How about you?* Depending on your current (or future) life situation, describe the benefits and drawbacks of a financial situation you have encountered during the past year.

## STEP 6: REVIEW AND REVISE YOUR PLAN

Financial planning is a dynamic process that does not end when you take a particular action. You need to regularly assess your financial decisions. You should do a complete review of your finances at least once a year. Changing personal, social, and economic factors may require more frequent assessments.

When life events affect your financial needs, this financial planning process will provide a vehicle for adapting to those changes. Regularly reviewing this decision-making process will help you make priority adjustments that will bring your financial goals and activities in line with your current life situation.

### DID YOU KNOW ?

Phone apps are available for comparing prices, locating an ATM, and monitoring investments. Mobile phones with Web access provide many personal finance capabilities with costs ranging from free to a few dollars.

**Step 6 Example** Over the next 6 to 12 months, Kent Mullins should reassess his financial, career, and personal situations. What employment opportunities or family circumstances might affect his need or desire to take a different course of action?

*How about you?* Depending on your current (or future) life situation, what factors in your life might affect your personal financial situation and decisions in the future?

	<b>Sheet 1</b> Personal data
	<b>Sheet 2</b> Financial institutions and advisers

## CONCEPT CHECK 1-1



- 1 What are the main elements of every decision we make?
- 2 What are some risks associated with financial decisions?
- 3 What are some common sources of financial planning information?
- 4 Why should you reevaluate your actions after making a personal financial decision?

**Action Application** Prepare a list of potential risks involved with making various personal and financial decisions. What actions might be taken to investigate and reduce these risks?

# Developing Personal Financial Goals

## Objective 2

Develop personal financial goals.

Since the United States is one of the richest countries in the world, it is difficult to understand why so many Americans have money problems. The answer seems to be the result of two main factors. The first is poor planning and weak money management habits in areas such as spending and the use of credit. The other factor is extensive advertising, selling efforts, and product availability. Achieving personal financial satisfaction starts with clear financial goals.

### TYPES OF FINANCIAL GOALS

Two factors commonly influence your financial aspirations for the future. The first is the time frame in which you would like to achieve your goals. The second is the type of financial need that drives your goals.

**TIMING OF GOALS** What would you like to do tomorrow? Believe it or not, that question involves goal setting, which may be viewed in three time frames.

- *short-term goals*, such as saving for a vacation or paying off small debts, will be achieved within the next year.
- *intermediate goals* have a time frame from one to five years.
- *long-term goals* involve financial plans that are more than five years off, such as retirement, money for children's college education, or the purchase of a vacation home.



A variety of personal and financial goals will motivate your actions.

Long-term goals should be planned in coordination with short-term and intermediate ones. Setting and achieving short-term goals is the basis for achieving long-term goals. For example, saving for a down payment to buy a house is an intermediate goal that can be a foundation for a long-term goal: owning your own home.

Goal frequency is another ingredient in the financial planning process. Some goals, such as vacations or money for gifts, may be set annually. Other goals, such as a college education, a car, or a house, occur less frequently.

**GOALS FOR DIFFERENT FINANCIAL NEEDS** A goal of obtaining increased career training is different from a goal of saving money to pay a semi-annual auto insurance premium. *Consumable-product goals* usually occur on a periodic basis and involve items that are used up relatively quickly, such as food, clothing, and entertainment. Such purchases, if made unwisely, can have a negative effect on your financial situation.

*Durable-product goals* usually involve infrequently purchased, expensive items such as appliances, cars, and sporting equipment; these consist of tangible items. In contrast, many people overlook *intangible-purchase goals*. These goals may relate to personal relationships, health, education, and leisure. Goal setting for these life circumstances is also necessary for your overall well-being.

### DID YOU KNOW?

A survey conducted by the Consumer Federation of America (CFA) estimates that more than 60 million American households will probably fail to realize one or more of their major life goals largely due to a lack of a comprehensive financial plan. In households with annual incomes of less than \$100,000, savers who say they have financial plans report about twice as much savings and investments as savers without plans.

## GOAL-SETTING GUIDELINES

An old saying goes, “If you don’t know where you’re going, you might end up somewhere else and not even know it.” Goal setting is central to financial decision making. Your financial goals are the basis for planning, implementing, and measuring the progress of your spending, saving, and investing activities. Exhibit 1-4 on page 10 offers typical goals and financial activities for various life situations.

Your financial goals should take as S-M-A-R-T approach, in that they are:

S—*specific*, so you know exactly what your goals are so you can create a plan designed to achieve those objectives.

M—*measurable* with a specific amount. For example, “Accumulate \$5,000 in an investment fund within three years” is more measurable than “Put money into an investment fund.”

A—*action-oriented*, providing the basis for the personal financial activities you will undertake. For example, “Reduce credit card debt” will usually mean actions to pay off amounts owed.

R—*realistic*, involving goals based on your income and life situation. For example, it is probably not realistic to expect to buy a new car each year if you are a full-time student.

T—*time-based*, indicating a time frame for achieving the goal, such as three years. This allows you to measure your progress toward your financial goals.

### My Life 2

My specific financial goals for the next year are written down.

Having specific financial goals in writing that you review on a regular basis is the foundation of successful personal financial planning. To start (or continue) creating and achieving your financial goals, use “Financial Planning for Life’s Situations: Developing Financial Goals” on page 11.

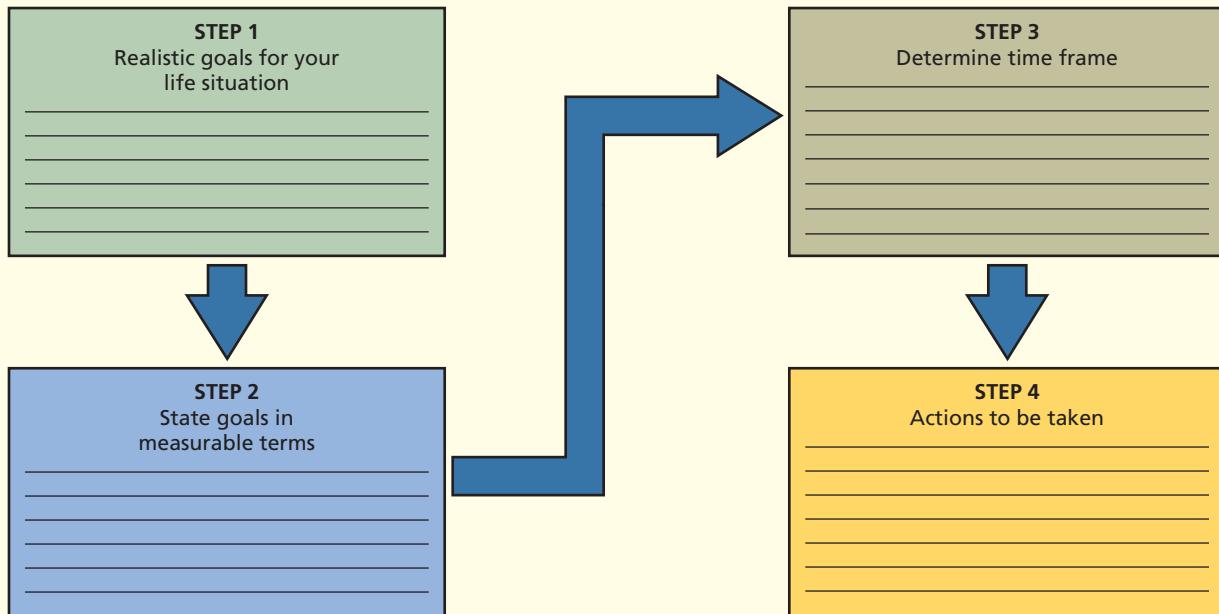
### Exhibit 1-4 Financial goals and activities for various life situations

Time to Take Action . . . Common Financial Goals and Activities		
If This Is Your Life Situation, You Should . . .	Specialized Financial Activities	
Young, single (18–35)	<ul style="list-style-type: none"> <li>• Obtain appropriate career training.</li> <li>• Create an effective financial recordkeeping system.</li> <li>• Develop a regular savings and investment program.</li> <li>• Accumulate an appropriate emergency fund.</li> <li>• Purchase appropriate types and amounts of insurance coverage.</li> <li>• Create and implement a flexible budget.</li> <li>• Evaluate and select appropriate investments.</li> <li>• Establish and implement a plan for retirement goals.</li> <li>• Make a will and develop an estate plan.</li> </ul>	
Young couple with children under 18	<ul style="list-style-type: none"> <li>• Establish financial independence.</li> <li>• Obtain disability insurance to replace income during prolonged illness.</li> <li>• Consider home purchase for tax benefit.</li> <li>• Carefully manage the increased need for the use of credit.</li> <li>• Obtain an appropriate amount of life insurance for the care of dependents.</li> <li>• Use a will to name guardian for children.</li> </ul>	
Single parent with children under 18	<ul style="list-style-type: none"> <li>• Obtain adequate amounts of health, life, and disability insurance.</li> <li>• Contribute to savings and investment fund for college.</li> <li>• Name a guardian for children and make other estate plans.</li> </ul>	
Young dual-income couple, no children	<ul style="list-style-type: none"> <li>• Coordinate insurance coverage and other benefits.</li> <li>• Develop savings and investment program for changes in life situation (larger house, children).</li> <li>• Consider tax-deferred contributions to retirement fund.</li> </ul>	
Older couple (50+), no dependent children at home	<ul style="list-style-type: none"> <li>• Review financial assets and estate plans.</li> <li>• Consider household budget changes several years prior to retirement.</li> <li>• Plan retirement housing, living expenses, recreational activities, and part-time work.</li> </ul>	
Mixed-generation household (elderly individuals and children under 18)	<ul style="list-style-type: none"> <li>• Obtain long-term health care insurance and life/disability income for care of younger dependents.</li> <li>• Use dependent care service if needed.</li> <li>• Provide arrangements for handling finances of elderly if they become ill.</li> <li>• Consider splitting of investment cost, with elderly getting income while alive and principal going to surviving relatives.</li> </ul>	
Older (50+), single	<ul style="list-style-type: none"> <li>• Make arrangement for long-term health care coverage.</li> <li>• Review will and estate plan.</li> <li>• Plan retirement living facilities, living expenses, and activities.</li> </ul>	

# Financial Planning for Life's Situations

## DEVELOPING FINANCIAL GOALS

Based on your current situation or expectations for the future, create one or more financial goals based on this process:



### CONCEPT CHECK 1-2

- 1 What are examples of long-term goals?
- 2 What are the five main characteristics of useful financial goals?

**Action Application** Ask friends, relatives, and others about their short-term and long-term financial goals. What are some of the common goals for various personal situations?



#### Sheet 3

Setting personal financial goals

## Influences on Personal Financial Planning

Many factors influence daily financial decisions, ranging from age and household size to interest rates and inflation. Three main elements affect financial planning activities: life situation, personal values, and economic factors.

### Objective 3

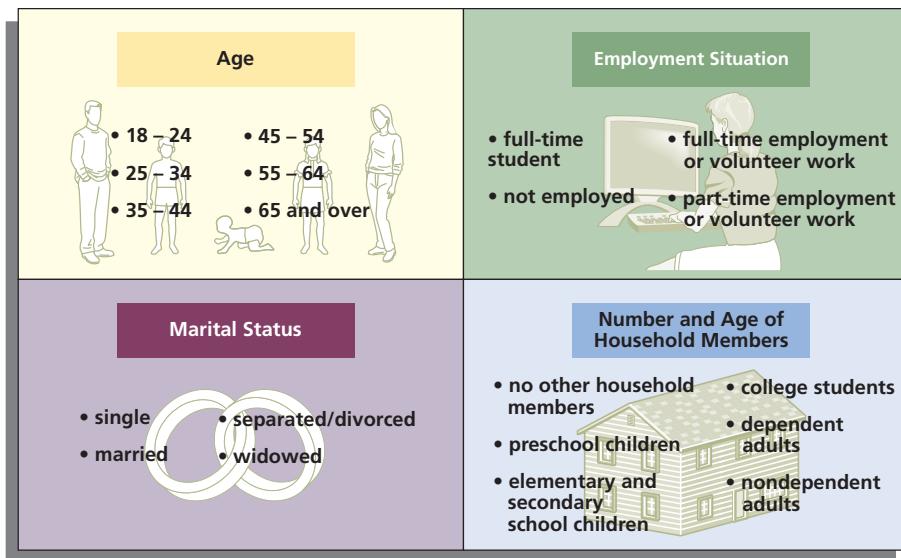
Assess personal and economic factors that influence personal financial planning.

### LIFE SITUATION AND PERSONAL VALUES

People in their 20s spend money differently than those in their 50s. Personal factors such as age, income, household size, and personal beliefs influence your spending and saving patterns. Your life situation or lifestyle is created by a combination of factors.

## Exhibit 1-5

Life situation influences on your financial decisions



## My Life 3

**My family and household situation is likely to stay fairly stable over the next year or two.**

Many personal, social, and economic factors can affect your life situation. Refer to Exhibit 1-4 for further information on financial goals and personal finance activities for various life situations.

As our society changes, different types of financial needs evolve. Today people tend to get married at a later age, and more households have two incomes. Many households are headed by single parents. More than 2 million women provide care for both dependent children and parents. We are also living longer; over 80 percent of all Americans now living are expected to live past age 65.

As Exhibit 1-5 shows, the **adult life cycle**—the stages in the family and financial needs of an adult—is an important influence on your financial activities and decisions. Your life situation is also affected by marital status, household size, and employment, as well as events such as

- Graduation (at various levels of education).
- Engagement and marriage.
- The birth or adoption of a child.
- A career change or a move to a new area.
- Dependent children leaving home.
- Changes in health.
- Divorce.
- Retirement.
- The death of a spouse, family member, or other dependent.

**adult life cycle** The stages in the family situation and financial needs of an adult.

**values** Ideas and principles that a person considers correct, desirable, and important.

**economics** The study of how wealth is created and distributed.

In addition to being defined by your family situation, you are defined by your **values**—the ideas and principles that you consider correct, desirable, and important. Values have a direct influence on such decisions as spending now versus saving for the future or continuing school versus getting a job.

## ECONOMIC FACTORS

Daily economic activities are another important influence on financial planning. In our society, the forces of supply and demand play an important role in setting prices. **Economics** is the study of how wealth is created and distributed. The economic environment includes various institutions, principally business, labor, and government, that must work together to satisfy our needs and wants.

While various government agencies regulate financial activities, the Federal Reserve System, our nation's central bank, has significant responsibility in our economy. *The*

Fed, as it is called, is concerned with maintaining an adequate money supply. It achieves this by influencing borrowing, interest rates, and the buying or selling of government securities. The Fed attempts to make adequate funds available for consumer spending and business expansion while keeping interest rates and consumer prices at an appropriate level.

**GLOBAL INFLUENCES** The global marketplace influences financial activities. Our economy is affected by both the financial activities of foreign investors and competition from foreign companies. American businesses compete against foreign companies for the spending dollars of American consumers.

When the level of exports of U.S.-made goods is lower than the level of imported goods, more U.S. dollars leave the country than the dollar value of foreign currency coming into the United States. This reduces the funds available for domestic spending and investment. Also, if foreign companies decide not to invest their dollars in the United States, the domestic money supply is reduced. This reduced money supply may cause higher interest rates.

**ECONOMIC CONDITIONS** Financial web sites provide current economic statistics. Exhibit 1-6 has an overview of some economic indicators that influence financial decisions. Your personal financial decisions are most heavily influenced by consumer prices, consumer spending, and interest rates.

**1. Consumer Prices** **Inflation** is a rise in the general level of prices. In times of inflation, the buying power of the dollar decreases. For example, if prices increased 5 percent during the last year, items that cost \$100 one year ago would now cost \$105. This means it now takes more money to buy the same amount of goods and services.

The main cause of inflation is an increase in demand without a comparable increase in supply. For example, if people have more money to spend because of pay increases or borrowing but the same amounts of goods and services are available, the increased demand can bid up prices for those goods and services.

Inflation is most harmful to people living on fixed incomes. Due to inflation, retired people and others whose incomes do not change are able to afford smaller amounts of goods and services.

Inflation can also adversely affect lenders of money. Unless an adequate interest rate is charged, amounts repaid by borrowers in times of inflation have less buying power than the money they borrowed. If you pay 10 percent interest on a loan and the inflation rate is 12 percent, the dollars you pay the lender have lost buying power. For this reason, interest rates rise in periods of high inflation.

The rate of inflation varies. During the late 1950s and early 1960s, the annual inflation rate was in the 1 to 3 percent range. During the late 1970s and early 1980s, the cost of living increased 10 to 12 percent annually. At a 12 percent annual inflation rate, prices double (and the value of the dollar is cut in half) in about six years. To find out how fast prices (or your savings) will double, use the *rule of 72*: Just divide 72 by the annual inflation (or interest) rate.



Various economic conditions affect the value of investments and your personal financial situation.

**inflation** A rise in the general level of prices.

### EXAMPLE: RULE OF 72

An annual inflation rate of 4 percent, for example, means prices will double in 18 years ( $72 \div 4 = 18$ ). Regarding savings, if you earn 6 percent, your money will double in 12 years ( $72 \div 6 = 12$ ).

## Exhibit 1-6 Changing economic conditions and financial decisions

Economic Factor	What It Measures	How It Influences Financial Planning
Consumer prices	The buying power of a dollar; changes in inflation.	If consumer prices increase faster than your income, you are unable to purchase the same amount of goods and services; higher consumer prices will also cause higher interest rates.
Consumer spending	The demand for goods and services by individuals and households.	Increased consumer spending is likely to create more jobs and higher wages; high levels of consumer spending and borrowing can also push up consumer prices and interest rates.
Interest rates	The cost of money; the cost of credit when you borrow; the return on your money when you save or invest.	Higher interest rates make buying on credit more expensive; higher interest rates make saving and investing more attractive and discourage borrowing.
Money supply	The dollars available for spending in our economy.	Interest rates tend to decline as more people save and invest; but higher saving (and lower spending) may also reduce job opportunities.
Unemployment	The number of people without employment who are willing and able to work.	People who are unemployed should reduce their debt level and have an emergency savings fund for living costs while out of work; high unemployment reduces consumer spending and job opportunities.
Housing starts	The number of new homes being built.	Increased home building results in more job opportunities, higher wages, more consumer spending, and overall economic expansion.
Gross domestic product (GDP)	The total value of goods and services produced within a country's borders, including items produced with foreign resources.	The GDP provides an indication of a nation's economic viability, resulting in employment and opportunities for increased personal wealth.
Trade balance	The difference between a country's exports and its imports.	If a country exports more than it imports, the balance of payments deficit can result in price changes for foreign goods.
Dow Jones Average, S&P 500, other stock market indexes	The relative value of stocks represented by the index.	These indexes provide an indication of the general movement of stock prices.

More recently, the annual price increase for most goods and services as measured by the consumer price index has been less than 2 percent. The *consumer price index (CPI)*, published by the Bureau of Labor Statistics, is a measure of the average change in the prices urban consumers pay for a fixed “basket” of goods and services. For current CPI information, go to [www.bls.gov](http://www.bls.gov).

Inflation rates can be deceptive. Most people face *hidden inflation* since the cost of necessities (food, gas, health care), on which they spend most of their money, may rise at a higher rate than the cost of nonessential items. This results in a *personal inflation rate* that is higher than the government’s CPI.

*Deflation*, a decline in prices, can also have damaging economic effects. As prices drop, consumers expect they will go even lower. As a result, they cut their spending, which causes damaging economic conditions. While widespread deflation is unlikely, certain items may be affected, and their prices will drop.

# HOW TO . . .

## Cope in Times of Financial Difficulty

At some point, financial uncertainty affects nearly everyone. Most wise personal financial planning strategies advocated during prosperous times are equally valid during times of financial difficulty. Fundamental personal economic decision making can serve individuals and households in all circumstances, such as:

### What

1. Reduce your use of debt.
2. Reduce spending.
3. Review the safety of your savings.
4. Evaluate insurance coverages.
5. Avoid financial scams.
6. Communicate with family members.

### Why

- While you may be tempted to pay for various items with a credit card, make every attempt to resist that action. Avoid additional debt in times of financial uncertainty.
- Difficult times require difficult actions. Decide which budget items can be eliminated or reduced. This action will allow you to better control your short-term and long-term financial situation.
- Make sure your accounts in banks and credit unions are within the limits covered by federal deposit insurance.
- While you may be tempted to reduce spending by reducing insurance costs, be sure you have adequate coverage for life, health, home, and motor vehicles. Savings can be gained by comparing various insurance companies.
- People are desperate when faced with financial difficulties, which can make them more vulnerable to investment fraud, credit repair swindles, and other deceptions. Obtain complete information before taking action. Don't rush into a "too good to be true" situation.
- Talking about the financial difficulties can reduce anxiety. These discussions can have benefits during the crisis and can help prepare children for financial situations they will likely encounter in their lifetime. Involve them in decisions that might be necessary to reduce family spending.

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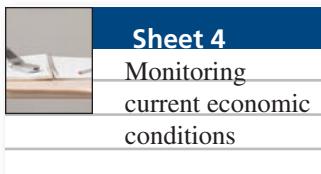
These suggestions may be valid for every financial situation in every economic setting. Your ability to know and use wise personal finance strategies will serve you in all stages of your life and in every stage of the business cycle.

**2. Consumer Spending** Total demand for goods and services in the economy influences employment opportunities and the potential for income. As consumer purchasing increases, the financial resources of current and prospective employees expand. This situation improves the financial condition of many households.

In contrast, reduced spending causes unemployment, since staff reduction commonly results from a company's reduced financial resources. The financial hardships of unemployment are a major concern of business, labor, and government. Retraining programs, income assistance, and job services can help people adjust.

**3. Interest Rates** In simple terms, interest rates represent the cost of money. Like everything else, money has a price. The forces of supply and demand influence interest rates. When consumer saving and investing increase the supply of money, interest rates tend to decrease. However, as consumer, business, government, and foreign borrowing increase the demand for money, interest rates tend to rise.

Interest rates affect your financial planning. The earnings you receive as a saver or an investor reflect current interest rates as well as a *risk premium* based on such factors as the length of time your funds will be used by others, expected inflation, and the extent of uncertainty about getting your money back. Risk is also a factor in the interest rate you pay as a borrower. People with poor credit ratings pay a higher interest rate than people with good credit ratings. Interest rates influence many financial decisions. Current interest rate data may be obtained at [www.federalreserve.gov](http://www.federalreserve.gov).



### CONCEPT CHECK 1-3

- 1 How do age, marital status, household size, employment situation, and other personal factors affect financial planning?
- 2 How might the uncertainty of inflation make personal financial planning difficult?
- 3 What factors influence the level of interest rates?

**Action Application** Using Web research and discussion with others, create an inflation rate that reflects the change in price for items commonly bought by you and your family.

## Opportunity Costs and the Time Value of Money

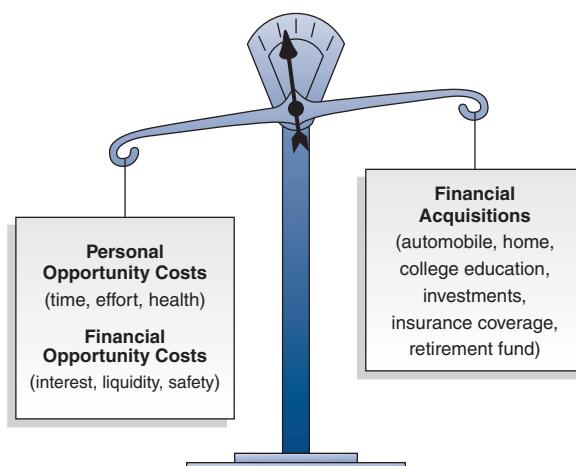
### Objective 4

Calculate time value of money situations associated with personal financial decisions.

Have you noticed that you must give up something when you make choices? In every financial decision, you sacrifice something to obtain something else that you consider more desirable. For example, you might forgo current buying to invest funds for future purchases or long-term financial security. Or you might gain the use of an expensive item now by making credit payments from future earnings. These *opportunity costs* may be viewed in terms of both personal and financial resources (see Exhibit 1-7).

### Exhibit 1-7

Opportunity costs and financial results should be assessed when making financial decisions



## PERSONAL OPPORTUNITY COSTS

An important personal opportunity cost involves time that, when used for one activity, cannot be used for other activities. Time used for studying, working, or shopping will not be available for other uses. The allocation of time should be viewed like any decision: Select your use of time to meet your needs, achieve your goals, and satisfy personal values.

Other personal opportunity costs relate to health. Poor eating habits, lack of sleep, or avoiding exercise can result in illness, time away from school or work, increased health care costs, and reduced financial security. Like financial resources, your personal resources (time, energy, health, abilities, knowledge) require careful management.

## FINANCIAL OPPORTUNITY COSTS

You are constantly making choices among various financial decisions. In making those choices, you must consider the **time value of money**, the increases in an amount of money as a result of interest earned. Saving or investing a dollar instead of spending it today results in a future amount greater than a dollar. Every time you spend, save, invest, or borrow money, you should consider the time value of that money as an opportunity cost. Spending money from your savings account means lost interest earnings; however, what you buy with that money may have a higher priority than those earnings. Borrowing to make a purchase involves the opportunity cost of paying interest on the loan, but your current needs may make this trade-off worthwhile.

The opportunity cost of the time value of money is also present in these financial decisions:

- Setting aside funds in a savings plan with little or no risk has the opportunity cost of potentially higher returns from an investment with greater risk.
- Having extra money withheld from your paycheck in order to receive a tax refund has the opportunity cost of the lost interest the money could earn in a savings account.
- Making annual deposits in a retirement account can help you avoid the opportunity cost of having inadequate funds later in life.
- Purchasing a new automobile or home appliance has the potential benefit of saving you money on future maintenance and energy costs.

**time value of money**  
Increases in an amount of money as a result of interest earned.

**INTEREST CALCULATIONS** Three amounts are required to calculate the time value of money for savings in the form of interest earned:

- The amount of the savings (commonly called the *principal*).
- The annual interest rate.
- The length of time the money is on deposit.

These three items are multiplied to obtain the amount of interest. Simple interest is calculated as follows:

$$\begin{array}{ccccc} \text{Amount} & \times & \text{Annual} & \times & \text{Time} \\ \text{in} & & \text{interest} & & \text{period} \\ \text{savings} & & \text{rate} & & \\ & & \times & & = \\ & & & & \text{Interest} \end{array}$$

For example, \$500 on deposit at 6 percent for six months would earn \$15 ( $\$500 \times 0.06 \times 6/12$ , or 1/2 year).

You can calculate the increased value of your money from interest earned in two ways: You can calculate the total amount that will be available later (future value), or you can determine the current value of an amount desired in the future (present value).

**future value** The amount to which current savings will increase based on a certain interest rate and a certain time period; also referred to as *compounding*.

**present value** The current value for a future amount based on a certain interest rate and a certain time period; also referred to as *discounting*.

**FUTURE VALUE OF A SINGLE AMOUNT** Deposited money earns interest that will increase over time. **Future value** is the amount to which current savings will increase based on a certain interest rate and a certain time period. For example, \$100 deposited in a 6 percent account for one year will grow to \$106. This amount is computed as follows:

$$\text{Future value} = \$100 + (\$100 \times 0.06 \times 1 \text{ year}) + \$106$$

Original amount	Amount of
in savings	interest earned

The same process could be continued for a second, third, and fourth year, but the computations would be time consuming. Future value tables simplify the process (see Exhibit 1-8). To use a future value table, multiply the amount deposited by the factor for the desired interest rate and time period. For example, \$650 at 8 percent for 10 years would have a future value of \$1,403.35 ( $\$650 \times 2.159$ ). The future value of an amount will always be greater than the original amount. As Exhibit 1-8A shows, all the future value factors are larger than 1.

Future value computations may be referred to as *compounding*, since interest is earned on previously earned interest. Compounding allows the future value of a deposit to grow faster than it would if interest were paid only on the original deposit.

The sooner you make deposits, the greater the future value will be. Depositing \$1,000 in a 5 percent account at age 40 will give you \$3,387 at age 65. However, making the \$1,000 deposit at age 25 would result in an account balance of \$7,040 at age 65.

### FUTURE VALUE OF A SERIES OF DEPOSITS

Quite often, savers and investors make regular deposits. An *annuity* is a series of equal deposits or payments. To determine the future value of equal yearly savings deposits, use Exhibit 1-8B. For this table to be used, the deposits must earn a constant interest rate. If you deposit \$50 a year at 7 percent for six years, starting at the end of the first year, you will have

\$357.65 at the end of that time ( $\$50 \times 7.153$ ). The Financial Planning Calculations box on page 19 presents an example of using future value to achieve a financial goal.

**PRESENT VALUE OF A SINGLE AMOUNT** Another aspect of the time value of money involves determining the current value of an amount desired in the future. **Present value** is the current value for a future amount based on a certain interest rate and a certain time period. Present value computations, also called *discounting*, allow you to determine how much to deposit now to obtain a desired total in the future. Present value tables (Exhibit 1-8C) can be used to make the computations. If you want \$1,000 five years from now and you earn 5 percent on your savings, you need to deposit \$784 ( $\$1,000 \times 0.784$ ).

The present value of the amount you want in the future will always be less than the future value, since all of the factors in Exhibit 1-8C are less than 1 and interest earned will increase the present value amount to the desired future amount.

**PRESENT VALUE OF A SERIES OF DEPOSITS** You can also use present value computations to determine how much you need to deposit so that you can take a certain amount out of the account for a desired number of years. For example, if you want to

## My Life 4

Time value of money calculations often guide my saving and spending decisions.

To assist you with using future value and present value computations for achieving personal financial goals, several Web sites are available: for example, [www.dinkytown.net](http://www.dinkytown.net), [www.moneychimp.com/calculator](http://www.moneychimp.com/calculator), and [cgi.money.cnn.com/tools](http://cgi.money.cnn.com/tools)

## Exhibit 1-8

Time value of money  
tables (condensed)

A. Future Value of \$1 (single amount)					
Year	Percent				
	5%	6%	7%	8%	9%
5	1.276	1.338	1.403	1.469	1.539
6	1.340	1.419	1.501	1.587	1.677
7	1.407	1.504	1.606	1.714	1.828
8	1.477	1.594	1.718	1.851	1.993
9	1.551	1.689	1.838	1.999	2.172
10	1.629	1.791	1.967	2.159	2.367
B. Future Value of a Series of Annual Deposits (annuity)					
Year	Percent				
	5%	6%	7%	8%	9%
5	5.526	5.637	5.751	5.867	5.985
6	6.802	6.975	7.153	7.336	7.523
7	8.142	8.394	8.654	8.923	9.200
8	9.549	9.897	10.260	10.637	11.028
9	11.027	11.491	11.978	12.488	13.021
10	12.578	13.181	13.816	14.487	15.193
C. Present Value of \$1 (single amount)					
Year	Percent				
	5%	6%	7%	8%	9%
5	0.784	0.747	0.713	0.681	0.650
6	0.746	0.705	0.666	0.630	0.596
7	0.711	0.665	0.623	0.583	0.547
8	0.677	0.627	0.582	0.540	0.502
9	0.645	0.592	0.544	0.500	0.460
10	0.614	0.558	0.508	0.463	0.422
D. Present Value of a Series of Annual Deposits (annuity)					
Year	Percent				
	5%	6%	7%	8%	9%
5	4.329	4.212	4.100	3.993	3.890
6	5.076	4.917	4.767	4.623	4.486
7	5.786	5.582	5.389	5.206	5.033
8	6.463	6.210	5.971	5.747	5.535
9	7.108	6.802	6.515	6.247	5.995
10	7.722	7.360	7.024	6.710	6.418

Note: See the appendix at the end of this chapter for more complete future value and present value tables.

# Financial Planning Calculations

## TIME VALUE OF MONEY CALCULATION METHODS

The time value of money may be calculated using a variety of techniques. When achieving specific financial goals requires regular deposits to a savings or investment account, the computation may occur in one of

several ways. For example, Jonie Emerson plans to deposit \$10,000 in an account for the next 10 years. She estimates these funds will earn an annual rate of 5 percent. What amount can Jonie expect to have available after 10 years?

Method	Process, Results
<b>Formula Calculation</b> The most basic method of calculating the time value of money involves using a formula. These are described in the appendix at the end of this chapter.	For this situation, the formula would be: $PV(1 + i)^n = FV$ The result should be $\$10,000 (1 + 0.05)^{10} = \$16,288.95$
<b>Time Value of Money Tables</b> Instead of calculating with a formula, time value of money tables are available. The numeric factors presented ease the computational process.	Using the future value table in Exhibit 1-8A: $\$10,000 \times \text{Future value of } \$1, 5\%, 10 \text{ years}$ $\$10,000 \times 1.629 = \$16,290$
<b>Financial Calculator</b> A variety of handheld financial calculators are programmed with various financial functions. Both future value and present value calculations may be performed using the appropriate keystrokes.	Using a financial calculator, the keystrokes would be: Amount <input type="text" value="-10000"/> PV Time periods <input type="text" value="10"/> N Interest rate <input type="text" value="5"/> I Result <input type="text" value="FV"/> \$ <input type="text" value="16,288.95"/>
<b>Spreadsheet Software</b> Excel and other spreadsheet programs have built-in formulas for various financial computations, including time value of money.	(Keystrokes for various brands and models of financial calculators are available at <a href="http://www.TVMCalcs.com">www.TVMCalcs.com</a> ) When using a spreadsheet program, this type of calculation would require this format: $= FV(\text{rate}, \text{periods}, \text{amount per period}, \text{single amount})$ The results of this example would be: $= FV(0.05, 10, 0, -10000) = \$16,288.95$
<b>Time Value of Money Web Sites</b> Many time-value-of-money calculators are also available online. These Web-based programs perform calculations for the future value of savings as well as determining amounts for loan payments.	Some easy-to-use calculators for computing the time value of money and other financial computations are located at <ul style="list-style-type: none"><li>• <a href="http://www.kiplinger.com/tools">www.kiplinger.com/tools</a></li><li>• <a href="http://www.dinkytown.net">www.dinkytown.net</a></li><li>• <a href="http://www.moneychimp.com/calculator">www.moneychimp.com/calculator</a></li><li>• <a href="http://cgi.money.cnn.com/tools">cgi.money.cnn.com/tools</a></li></ul>

Note: The slight differences in answers are the result of rounding.

take \$400 out of an investment account each year for nine years and your money is earning an annual rate of 8 percent, you can see from Exhibit 1-8D that you would need to make a current deposit of \$2,498.80 ( $\$400 \times 6.247$ ).

The formulas for calculating future and present values, as well as tables covering a wider range of interest rates and time periods, are presented in the appendix at the end of this chapter. Additional methods for calculating time value of money are also shown in the “Financial Planning Calculations” box.

### DID YOU KNOW ?

If you invest \$2,000 a year (at 9 percent) from ages 31 to 65, these funds will grow to \$470,249 by age 65. However, if you save \$2,000 a year (at 9 percent) for only 9 years from ages 22 to 30, at age 65 this fund will be worth \$579,471! Most important: Start investing something now!



### CONCEPT CHECK 1-4

- 1 How can you use future value and present value computations to measure the opportunity cost of a financial decision?
- 2 Use the time value of money tables in Exhibit 1-8 to calculate the following:
  - a. The future value of \$100 at 7 percent in 10 years.
  - b. The future value of \$100 a year for six years earning 6 percent.
  - c. The present value of \$500 received in eight years with an interest rate of 8 percent.

**Action Application** What is the relationship between current interest rates and financial opportunity costs? Using time value of money calculations, state one or more goals in terms of an annual savings amount and the future value of this savings objective.



**Sheet 5**  
Time value  
of money  
calculations

## Achieving Financial Goals

Throughout life, our needs usually can be satisfied with the intelligent use of financial resources. Financial planning involves deciding how to obtain, protect, and use those resources. By using the eight major areas of personal financial planning to organize your financial activities, you can avoid many common money mistakes.

### COMPONENTS OF PERSONAL FINANCIAL PLANNING

This book is designed to provide a framework for the study and planning of personal financial decisions. Exhibit 1-9 presents an overview of the eight major personal financial planning areas. To achieve a successful financial situation, you must coordinate these components through an organized plan and wise decision making.

**OBTAINING (CHAPTER 2)** You obtain financial resources from employment, investments, or ownership of a business. Obtaining financial resources is the foundation of financial planning, since these resources are used for all financial activities.

### Objective 5

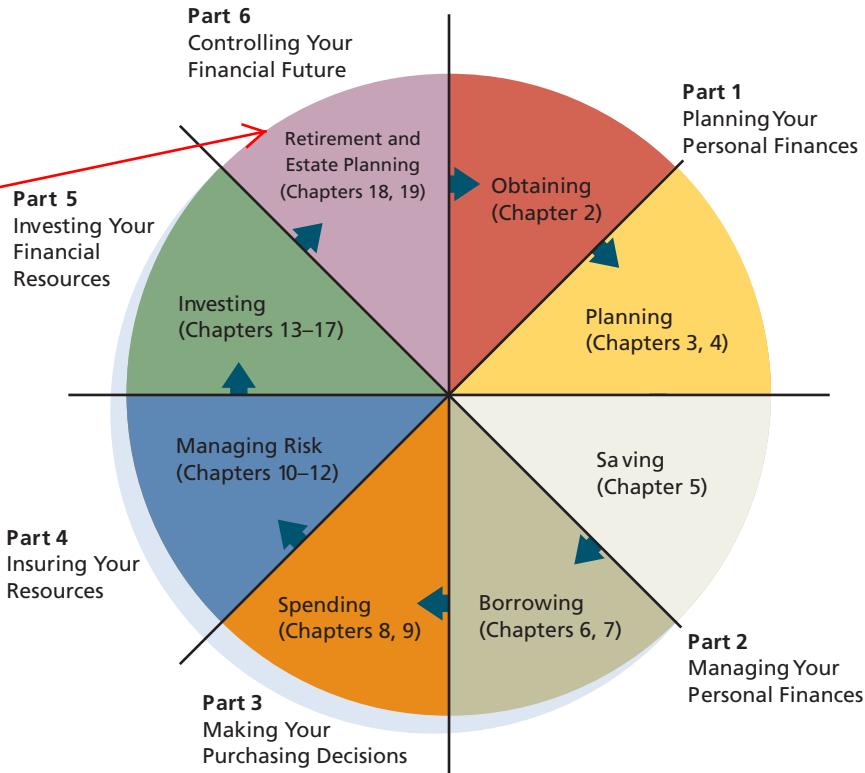
Identify strategies for achieving personal financial goals for different life situations.

**Online Sources for Obtaining** Many guidelines for effective career planning and professional development may be obtained at [www.rileyguide.com](http://www.rileyguide.com) and [www.monster.com](http://www.monster.com).

### Exhibit 1-9

Components of personal financial planning

We have a note to use "color21". Since the color is too dark and the type is in blank, we have used 40% tint of color21. Please check and confirm.



**PLANNING (CHAPTERS 3, 4)** Planned spending through budgeting is the key to achieving goals and future financial security. Efforts to anticipate expenses and financial decisions can also help reduce taxes. The ability to pay your fair share of taxes—no more, no less—is vital to increasing your financial resources.

**Online Sources for Planning** Budgeting is an ongoing activity, and tax planning should not occur only around April 15. For assistance, go to [www.money.com](http://www.money.com), [www.20somethingfinance.com](http://www.20somethingfinance.com), and [www.irs.gov](http://www.irs.gov).

**SAVING (CHAPTER 5)** Long-term financial security starts with a regular savings plan for emergencies, unexpected bills, replacement of major items, and the purchase of special goods and services, such as a college education, a boat, or a vacation home. Once you have established a basic savings plan, you may use additional money for investments that offer greater financial growth.

An amount of savings must be available to meet current household needs. **Liquidity** refers to the ability to readily convert financial resources into cash without a loss in value. The need for liquidity will vary based on a person's age, health, and family situation. Savings plans such as interest-earning checking accounts, money market accounts, and money market funds earn money on your savings while providing liquidity.

**liquidity** The ability to readily convert financial resources into cash without a loss in value.

**Online Sources for Saving** Fast updates on savings rates and other banking services are available at [www.bankrate.com](http://www.bankrate.com) and [www.banx.com](http://www.banx.com).

**BORROWING (CHAPTERS 6, 7)** Maintaining control over your credit-buying habits will contribute to your financial goals. The overuse and misuse of credit may cause a situation in which a person's debts far exceed the resources available to pay those debts. **Bankruptcy** is a set of federal laws that allow you to either restructure your debts or remove certain debts. The people who declare bankruptcy each year may have avoided this trauma with wise spending and borrowing decisions. Chapter 7 discusses bankruptcy in detail.

**bankruptcy** A set of federal laws that allow you to either restructure your debts or remove certain debts.

**Online Sources for Borrowing** Current rates for credit cards, personal loans, and other types of credit are available at [www.bankmonitornotes.com](http://www.bankmonitornotes.com), [www.consumercredit.com](http://www.consumercredit.com) and [www.bankrate.com](http://www.bankrate.com).

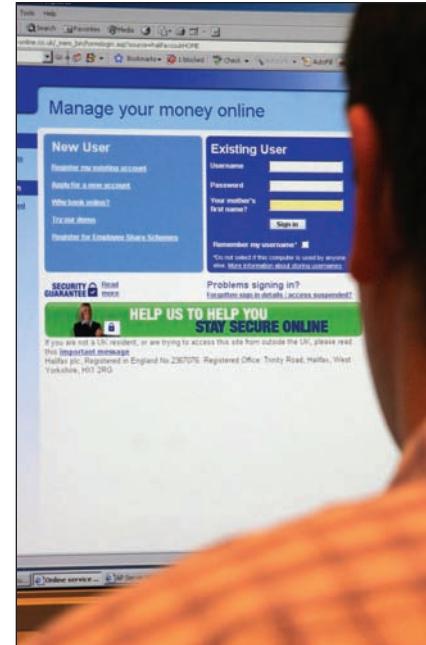
**SPENDING (CHAPTERS 8, 9)** Financial planning is designed not to prevent your enjoyment of life but to help you obtain the things you want. Too often, however, people make purchases without considering the financial consequences. Some people shop compulsively, creating financial difficulties. You should detail your living expenses and your other financial obligations in a spending plan. Spending less than you earn is the only way to achieve long-term financial security.

**Online Sources for Spending** Consumer buying information is available at [www.consumerworld.org](http://www.consumerworld.org) and [www.consumer.gov](http://www.consumer.gov). Over 70 percent of car buyers research purchases online at Web sites such as [www.autoweb.com](http://www.autoweb.com) and [autos.msn.com](http://autos.msn.com). Prospective home buyers can obtain financing online at [www.hsh.com](http://www.hsh.com) and [www.eloan.com](http://www.eloan.com).

**MANAGING RISK (CHAPTERS 10–12)** Adequate insurance coverage is another component of personal financial planning. Certain types of insurance are commonly overlooked in financial plans. For example, the number of people who suffer disabling injuries or diseases at age 50 is greater than the number who die at that age, so people may need disability insurance more than they need life insurance. Yet surveys reveal that most people have adequate life insurance but few have disability insurance. The insurance industry is more aggressive in selling life insurance than in selling disability insurance, thus putting the burden of obtaining adequate disability insurance on you.

Many households have excessive or overlapping insurance coverage. Insuring property for more than it is worth may be a waste of money, as may both a husband and a wife having similar health insurance coverage.

**Online Sources for Managing Risk** Insurance planning assistance and rate quotes may be obtained at [personalinsure.about.com](http://personalinsure.about.com) and [www.carinsurance.com](http://www.carinsurance.com).



The planning component of personal finance provides a foundation for other activities.

**INVESTING (CHAPTERS 13–17)** While many types of investment vehicles are available, people invest for two primary reasons. Those interested in *current income* select investments that pay regular dividends or interest. In contrast, investors who desire *long-term growth* choose stocks, mutual funds, real estate, and other investments with potential for increased value in the future.

You can achieve investment diversification by including a variety of assets in your *portfolio*—for example, stocks, bond mutual funds, real estate, and collectibles such as rare coins. Obtaining general investment advice is easy; however, it is more difficult to obtain specific investment advice to meet your individual needs and goals.

**Online Sources for Investing** “Information is power”—this is especially true when investing. You can obtain company information and investment assistance at [finance.yahoo.com](http://finance.yahoo.com), [www.fool.com](http://www.fool.com), and [www.marketwatch.com](http://www.marketwatch.com).

## DID YOU KNOW?

In 1935, Grace Groner purchased three shares of Abbott Laboratories stock for \$180. In 2010, at the time of her death, as a result of stock splits and reinvested dividends, that initial investment was worth \$7 million. These funds were donated to Lake Forest College, where Groner attended school, to provide scholarships for foreign study and internships.

## RETIREMENT AND ESTATE PLANNING (CHAPTERS 18, 19)

Most people desire financial security upon completion of full-time employment. But retirement planning also involves thinking about your housing situation, your recreational activities, and possible part-time or volunteer work.

Transfers of money or property to others should be timed, if possible, to minimize the tax burden and maximize the benefits for those receiving the financial resources. A knowledge of property transfer methods can help you select the best course of action for funding current and future living costs, educational expenses, and retirement needs of dependents.

**Online Sources for Retirement and Estate Planning** Whether you are 40 years or 40 minutes away from retiring, you can obtain assistance at [retireplan.about.com](http://retireplan.about.com), [www.aarp.org](http://www.aarp.org), and [www.estateplanninglinks.com](http://www.estateplanninglinks.com).

## DEVELOPING A FLEXIBLE FINANCIAL PLAN

**financial plan** A formalized report that summarizes your current financial situation, analyzes your financial needs, and recommends future financial activities.

A **financial plan** is a formalized report that summarizes your current financial situation, analyzes your financial needs, and recommends future financial activities. You can create this document on your own, seek assistance from a financial planner, or use a money management software package. Exhibit 1-10 offers a framework for developing and implementing a financial plan, along with examples for several life situations.

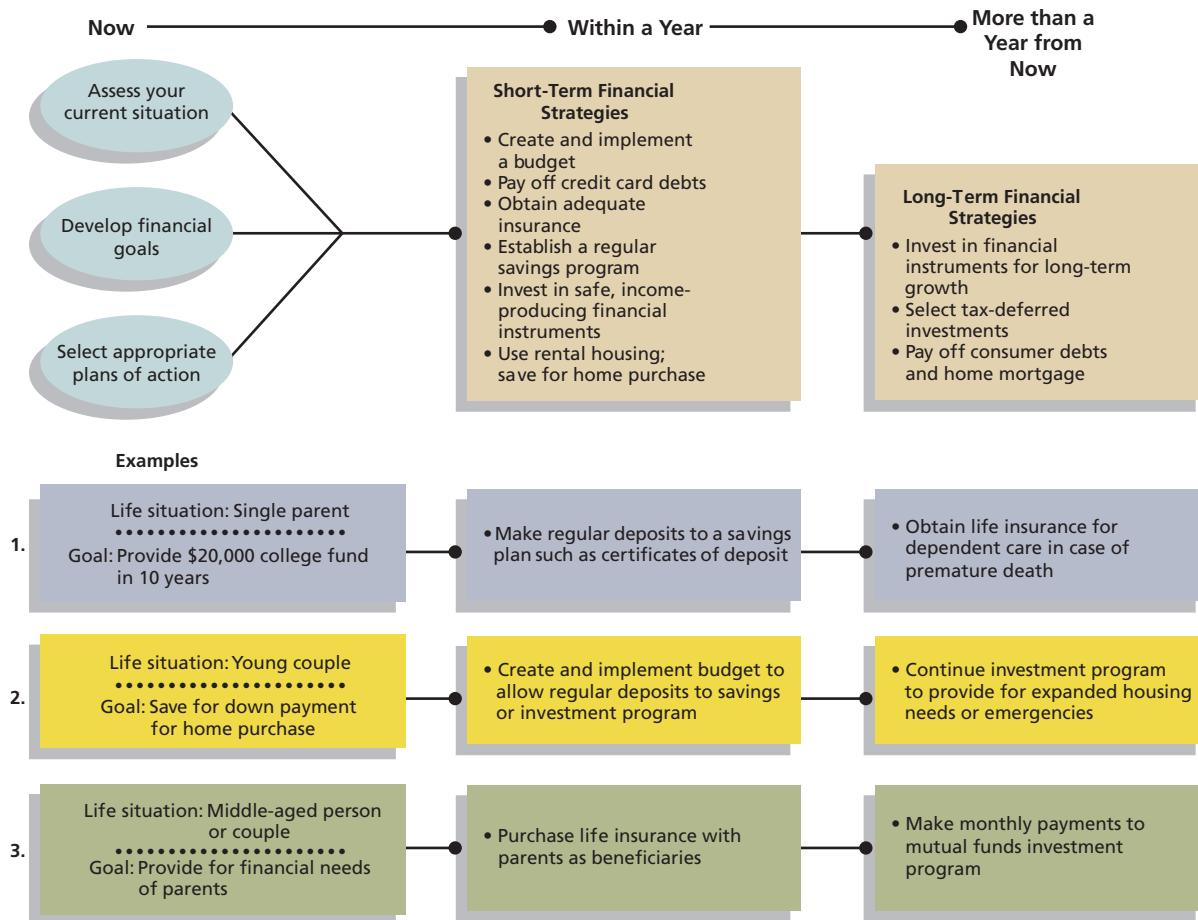
## IMPLEMENTING YOUR FINANCIAL PLAN

You must have a plan before you can implement it. However, once you have clearly assessed your current situation and identified your financial goals, what do you do next?

The most important strategy for success is to develop financial habits that contribute to both short-term satisfaction and long-term financial security, including the following:

1. Using a well-conceived spending plan will help you stay within your income while you save and invest for the future. The main source of financial difficulties is overspending.
2. Having appropriate insurance protection will help you prevent financial disasters.
3. Becoming informed about tax and investment alternatives will help you expand your financial resources.

## Exhibit 1-10 Financial planning in action for different life situations



## STUDYING PERSONAL FINANCE

Within each chapter of this book are various learning devices to help you build knowledge. The *Personal Financial Planner* sheets provide a framework for creating and implementing your financial activities. The Web site ([www.mhhe.com/kdh](http://www.mhhe.com/kdh)) connects you to additional resources and activities. As you move into the following chapters, we recommend that you:

- Read and study the book carefully. Use the Concept Checks and end-of-chapter activities.
- Use media sources for the latest personal finance information.
- Talk to others, experts and friends, who have knowledge of various money topics.
- Search the Web for answers to questions that result from your desire to know more.

Achieving your financial objectives requires two things: (1) a willingness to learn and (2) appropriate information sources. You must provide the first element; the material that follows will provide the second. For successful financial planning, know where you are now, know where you want to be, and be persistent in your efforts to get there.

## My Life 5

I am able to name specific types of risks that can affect my personal financial decisions.

All decisions involve risk. Some risks are minor with limited consequences. Others can have long-term effects. Inflation and interest rates will influence your financial decisions. Information on changing economic conditions is available at [www.bls.gov](http://www.bls.gov), [www.federalreserve.gov](http://www.federalreserve.gov), and [www.bloomberg.com](http://www.bloomberg.com).

## CONCEPT CHECK 1-5



- 1 What are the main components of personal financial planning?
- 2 What is the purpose of a financial plan?
- 3 Identify some common actions taken to achieve financial goals.

**Action Application** Prepare a list of questions that might be asked of a financial planning professional by (1) a young professional starting out on his or her own, (2) a young couple planning for their children's education and for their own retirement, and (3) a person nearing retirement.

## My Life Stage for Financial Planning . . .

...in college	...in my 20s	...in my 30s and 40s	...in my 50s and beyond
<ul style="list-style-type: none"> <li>• Develop wise budgeting habits</li> <li>• Create a regular savings program</li> <li>• Establish a plan for wise use of banking services and credit</li> </ul>	<ul style="list-style-type: none"> <li>• Pay off any college loans</li> <li>• Increase amounts saved and invested</li> <li>• Continue proper spending and credit habits.</li> </ul>	<ul style="list-style-type: none"> <li>• Assess progress toward long-term financial goals</li> <li>• Evaluate needed insurance as a result of changes in household or financial situation</li> </ul>	<ul style="list-style-type: none"> <li>• Assess need for long-term health care coverage</li> <li>• Review will and estate plan</li> <li>• Consider various activities, locations for retirement.</li> </ul>

## SUMMARY OF OBJECTIVES

### Objective 1

#### Analyze the process for making personal financial decisions.

When making major financial decisions, use a variety of information sources to implement the personal financial planning process: (1) determine your current financial situation, (2) develop financial goals, (3) identify alternative courses of action, (4) evaluate alternatives, (5) create and implement a financial action plan, and (6) review and revise the financial plan.

### Objective 2

#### Develop personal financial goals.

The financial goals you develop should (1) be realistic, (2) be stated in specific, measurable terms, (3) have a time frame, and (4) indicate the type of action to be taken.

### Objective 3

#### Assess personal and economic factors that influence personal financial planning.

Financial goals and financial planning decisions are affected by a person's life situation (income, age, household size, health)

and personal values, and by economic factors (prices, interest rates, and employment opportunities).

### Objective 4

#### Calculate time value of money situations associated with personal financial decisions.

Every decision involves a trade-off with things given up. Personal opportunity costs include time, effort, and health. Financial opportunity costs are based on time value of money calculations. Future value and present value calculations enable you to measure the increased value (or lost interest) that results from a saving, investing, borrowing, or purchasing decision.

### Objective 5

#### Identify strategies for achieving personal financial goals for different life situations.

Successful financial planning requires specific goals combined with spending, saving, investing, and borrowing strategies based on your personal situation and various social and economic factors, especially inflation and interest rates.

## KEY TERMS

**adult life cycle** 12

**bankruptcy** 23

**economics** 12

**financial plan** 24

**future value** 18

**inflation** 13

**liquidity** 22

**opportunity cost** 5

**personal financial planning** 2

**present value** 18

**time value of money** 17

**values** 12

## SELF-TEST PROBLEMS

1. The Rule of 72 provides a guideline for determining how long it takes your money to double. This rule can also be used to determine your earning rate. If your money is expected to double in 12 years, what is your rate of return?
2. If you desire to have \$10,000 in savings eight years from now, what amount would you need to deposit in an account that earns 5 percent?

### Self-Test Solutions

1. Using the Rule of 72, if your money is expected to double in 12 years, you are earning approximately 6 percent ( $72 \div 12$  years = 6 percent).
2. To calculate the present value of \$10,000 for eight years at 5 percent, use Exhibit 1-8C, p. 19 (or Exhibit 1-C, p. 39):  
$$\$10,000 \times 0.677 = \$6,770$$

## FINANCIAL PLANNING PROBLEMS

(Note: Some of these problems require the use of the time value of money tables in the chapter appendix.)

1. *Calculating the Future Value of Property.* Ben Collins plans to buy a house for \$220,000. If that real estate is expected to increase in value by 3 percent each year, what will its approximate value be seven years from now? (Obj. 3)

- 2.** *Using the Rule of 72.* Using the rule of 72, approximate the following amounts. (Obj. 3)
- If the value of land in an area is increasing 6 percent a year, how long will it take for property values to double?
  - If you earn 10 percent on your investments, how long will it take for your money to double?
  - At an annual interest rate of 5 percent, how long will it take for your savings to double?
- 3.** *Determining the Inflation Rate.* In 2000, selected automobiles had an average cost of \$16,000. The average cost of those same automobiles is now \$28,000. What was the rate of increase for these automobiles between the two time periods? (Obj. 3)
- 4.** *Computing Future Living Expenses.* A family spends \$36,000 a year for living expenses. If prices increase by 2 percent a year for the next three years, what amount will the family need for their living expenses after three years? (Obj. 3)
- 5.** *Calculating Earnings on Savings.* What would be the yearly earnings for a person with \$8,000 in savings at an annual interest rate of 2.5 percent? (Obj. 4)
- 6.** *Computing the Time Value of Money.* Using time value of money tables, calculate the following. (Obj. 4)
- The future value of \$450 six years from now at 7 percent.
  - The future value of \$800 saved each year for 10 years at 8 percent.
  - The amount a person would have to deposit today (present value) at a 6 percent interest rate to have \$1,000 five years from now.
  - The amount a person would have to deposit today to be able to take out \$500 a year for 10 years from an account earning 8 percent.
- 7.** *Calculating the Future Value of a Series of Amounts.* Elaine Romberg prepares her own income tax return each year. A tax preparer would charge her \$80 for this service. Over a period of 10 years, how much does Elaine gain from preparing her own tax return? Assume she can earn 3 percent on her savings. (Obj. 4)
- 8.** *Calculating the Time Value of Money for Savings Goals.* If you desire to have \$20,000 for a down payment for a house in five years, what amount would you need to deposit today? Assume that your money will earn 5 percent. (Obj. 4)
- 9.** *Calculating the Present Value of a Series.* Pete Morton is planning to go to graduate school in a program of study that will take three years. Pete wants to have \$12,000 available each year for various school and living expenses. If he earns 4 percent on his money, how much must be deposited at the start of his studies to be able to withdraw \$12,000 a year for three years? (Obj. 4)
- 10.** *Using the Time Value of Money for Retirement Planning.* Carla Lopez deposits \$3,000 a year into her retirement account. If these funds have an average earning of 9 percent over the 40 years until her retirement, what will be the value of her retirement account? (Obj. 4)
- 11.** *Calculating the Value of Reduced Spending.* If a person spends \$15 a week on coffee (assume \$750 a year), what would be the future value of that amount over 10 years if the funds were deposited in an account earning 3 percent? (Obj. 4)
- 12.** *Calculating the Present Value of Future Cash Flows.* A financial company advertises on television that they will pay you \$60,000 now in exchange for annual payments of \$10,000 that you are expected to receive for a legal settlement over the next 10 years. If you estimate the time value of money at 10 percent, would you accept this offer? (Obj. 4)
- 13.** *Calculating the Potential Future Value of Savings.* Tran Lee plans to set aside \$2,400 a year for the next six years, earning 4 percent. What would be the future value of this savings amount? (Obj. 4)
- 14.** *Determining a Loan Payment Amount.* If you borrow \$8,000 with a 5 percent interest rate, to be repaid in five equal yearly payments, what would be the amount of each payment? (Note: Use the present value of an annuity table in the chapter appendix.) (Obj. 4)

## FINANCIAL PLANNING ACTIVITIES

- Comparing Financial Planning Actions.* Survey friends, relatives, and others to determine the process they use when making financial decisions. How do these people measure risk when making financial decisions? (Obj. 1)
- Using Financial Planning Experts.* Prepare a list of financial planning specialists (investment advisers, credit counselors, insurance agents, real estate brokers, tax preparers) in your community who can assist people with personal financial planning. (Obj. 1, 3)
- Setting Financial Goals.* Using Sheet 3 in the *Personal Financial Planner*, create one short-term and one long-term goal for people in these life situations: (a) a young single person, (b) a single parent with a child age 8, (c) a married person with no children, and (d) a retired person. (Obj. 2)
- Analyzing Changing Life Situations.* Ask friends, relatives, and others how their spending, saving, and borrowing activities changed when they decided to continue their education, change careers, or have children. (Obj. 3)
- Researching Economic Conditions.* Use library resources, such as *The Wall Street Journal*, [www.businessweek.com](http://www.businessweek.com), or other Web sites to determine recent trends in interest rates, inflation, and other economic indicators. Information about the consumer

price index (measuring changes in the cost of living) may be obtained at [www.bls.gov](http://www.bls.gov). Report how this economic information might affect your financial planning decisions. (Obj. 3)

6. *Comparing Alternative Financial Actions.* What actions would be necessary to compare a financial planner who advertises “One Low Fee Is Charged to Develop Your Personal Financial Plan” and one that advertises “You Are Not Charged a Fee, My Services Are Covered by the Investment Company for Which I Work”? (Obj. 4, 5)

## Now What Should I Do?

When Nina opened the letter from her aunt, she discovered a wonderful surprise. “My aunt has given me a gift of \$12,000!”

“Why would she do that?” mused Kevin.

“I guess her investments have increased in value by much more than she needs. She wants to share it with family members.” Nina shrugged, still in a little bit of shock. “I wonder what I should do with the money?”

“Oh, I have some suggestions for you . . .” Kevin said.

Recovering herself, Nina teased, “Wait a minute! When did this become *our* money?”

Kevin threw his hands in the air. “Hey, I just thought I’d offer some ideas.”

After some discussion, Nina considered the following uses for the money:

*Credit card debt*—use a portion of the money to pay off credit card bills from her last vacation.

*Savings*—set aside money for a down payment on a house.

*Long-term investments*—invest the money in a tax-deferred retirement account.

## FINANCIAL PLANNING CASE

*Career training*—use the money for technology certification courses to enhance her earning power.

*Community donations*—contribute funds to a homeless shelter and a world hunger-relief organization.

“Wow, I could easily use \$100,000 instead of \$12,000!” Nina laughed. “So what should I do?”

“Some financial advisors recommend not doing *anything* for at least 6 months,” warned Kevin. “You might be tempted to buy on impulse instead of spending the money on things with lasting value.”

“Well now I’m really not sure what to do!”

### Questions

- Which additional information might be necessary to know about Nina before determining which areas of financial planning should be her top priority?
- How might time value of money calculations be used by Nina in her decision-making process?
- What actions do you recommend that Nina take before making a final decision about the use of these funds?

## PERSONAL FINANCIAL PLANNER IN ACTION

### Starting Your Financial Plan

Planning is the foundation for success in every aspect of life. Assessing your current financial situation, along with setting goals is the key to successful financial planning.

Your Short-Term Financial Planning Activities	Resources
1. Prepare a list of personal and financial information for yourself and family members. Also create a list of financial service organizations that you use.	PFP Sheets 1, 2 <a href="http://www.money.com">www.money.com</a> <a href="http://www.kiplinger.com">www.kiplinger.com</a>
2. Set financial goals related to various current and future needs.	PFP Sheet 3 <a href="http://financialplan.about.com">http://financialplan.about.com</a>
3. Monitor current economic conditions (inflation, interest rates) to determine possible actions to take related to your personal finances.	PFP Sheet 4 <a href="http://www.federalreserve.gov">www.federalreserve.gov</a> <a href="http://www.bls.gov">www.bls.gov</a>
Your Long-Term Financial Planning Activities	Resources
1. Based on various financial goals, calculate the savings deposits necessary to achieve those goals.	PFP Sheet 5 <a href="http://www.dinkytown.net">www.dinkytown.net</a>
2. Identify various financial planning actions for you and other household members for the next two to five years.	Text pages <a href="http://www.moneycentral.msn.com">www.moneycentral.msn.com</a>



## CONTINUING CASE

### Getting Started

#### *Life Situation*

Single  
Age 21  
No dependents  
College student

#### *Financial Data*

Monthly income \$1,750  
Living expenses \$1,210  
Personal Property \$7,300  
Saving \$2,000  
Student Loan \$3,000  
Credit Card Debt \$2,400

Shelby Johnson has a flair for grooming dogs and cats. She hopes to open her own pet Salon when she graduates college. She is currently completing her sophomore year in business while working at a local pet store. Shelby has been living with a roommate (Melinda) in an apartment near her work in order to reduce her living expenses. However, she continually uses her credit card to make ends meet.

Her personal property consists of a 2005 car (\$5,550) that gets great gas mileage, a television set with a DVD player (\$400), a digital camera (\$50), a laptop computer (\$400), clothing (\$300), and some furnishings valued at \$600 (bed, dresser, lamp, clock, couch) with a total value of \$7,300.

### Questions

- Given her current situation, list various personal financial decisions that Shelby may be considering at this point in her life.
- Describe what short-term, intermediate and long-term goals Shelby should develop using the “Setting Personal Financial Goals” worksheet located at the back of this book.
- What types of time value of money calculations would be helpful for Shelby?

## DAILY SPENDING DIARY

*“I first thought this process would be a waste of time, but the information has helped me become much more careful of how I spend my money.”*

### Directions

Nearly everyone who has taken the effort to keeping a Daily Spending Diary has found it beneficial. While at first the process may seem tedious, after awhile, recording this information becomes easier and faster.

Using the “Daily Spending Diary” sheets, record every cent of your spending each day in the categories provided. Or you may create your own format to monitor your spending. You can indicate the use of a credit card with (CR). This experience will help you better understand your spending patterns and identify desired changes you might want to make in your spending habits.

### Analysis Questions

- What did your Daily Spending Diary reveal about your spending habits? What areas of spending might you consider changing?
- How might your Daily Spending Diary assist you when identifying and achieving financial goals?

The daily spending diary sheets are located in Appendix C at the end of the book and on the student Web site [www.mhhe.com/kdh](http://www.mhhe.com/kdh)

# 1

# Appendix: The Time Value of Money: Future Value and Present Value Computations

“If I deposit \$10,000 today, how much will I have for a down payment on a house in five years?”

“Will \$2,000 saved each year give me enough money when I retire?”

“How much must I save today to have enough for my children’s college education?”

The *time value of money*, more commonly referred to as *interest*, is the cost of money that is borrowed or lent. Interest can be compared to rent, the cost of using an apartment or other item. The time value of money is based on the fact that a dollar received today is worth more than a dollar that will be received one year from today, because the dollar received today can be saved or invested and will be worth more than a dollar a year from today. Similarly, a dollar that will be received one year from today is currently worth less than a dollar today.

The time value of money has two major components: future value and present value. *Future value* computations, which are also referred to as *compounding*, yield the amount to which a current sum will increase based on a certain interest rate and period of time. *Present value*, which is calculated through a process called *discounting*, is the current value of a future sum based on a certain interest rate and period of time.

In future value problems, you are given an amount to save or invest and you calculate the amount that will be available at some future date. With present value problems, you are given the amount that will be available at some future date and you calculate the current value of that amount. Both future value and present value computations are based on basic interest rate calculations.

## Interest Rate Basics

Simple interest is the dollar cost of borrowing or the earnings from lending money. The interest is based on three elements:

- The dollar amount, called the *principal*.
- The *rate of interest*.
- The amount of *time*.

The formula and financial calculator computations are as follows:

Interest Rate Basics	
Formula	Financial Calculator*
Interest = Principal × Rate of interest (annual) × Time (years)	

Formula	Financial Calculator*
<p>The interest rate is stated as a percentage for a year. For example, you must convert 12 percent to either 0.12 or 12/100 before doing your calculations. The time element must also be converted to a decimal or fraction. For example, three months would be shown as 0.25, or 1/4 of a year. Interest for 2½ years would involve a time period of 2.5.</p>	
<p><b>Example A:</b> Suppose you borrow \$1,000 at 5 percent and will repay it in one payment at the end of one year. Using the simple interest calculation, the interest is \$50, computed as follows:</p>	
$\$50 = \$1,000 \times 0.05 \times 1 \text{ (year)}$	
<p><b>Example B:</b> If you deposited \$750 in a savings account paying 8 percent, how much interest would you earn in nine months? You would compute this amount as follows:</p>	
Interest = $\$750 \times 0.08 \times 3/4$ (or 0.75 of a year) = \$45	-750 <b>PV</b> , 8 <b>I/Y</b> , 9/12 = .75 <b>N</b> , 0 <b>PMT</b> , <b>CPT</b> <b>FV</b> 795. 795 - 750 = 45

\*(Note: These financial calculator notations may require slightly different keystrokes when using various brands and models, see [www.TVMCalcs.com](http://www.TVMCalcs.com).)

### SAMPLE PROBLEM 1

How much interest would you earn if you deposited \$300 at 6 percent for 27 months?  
(Answers to sample problems are on page 35.)

### SAMPLE PROBLEM 2

How much interest would you pay to borrow \$670 for eight months at 12 percent?

## Future Value of a Single Amount

The future value of an amount consists of the original amount plus compound interest. This calculation involves the following elements:

FV = Future value

PV = Present value

i = Interest rate

n = Number of time periods

The formula and financial calculator computations are as follows:

Future Value of a Single Amount															
Formula	Table	Financial Calculator													
$FV = PV(1 + i)^n$	$FV = PV$ (Table factor)	<b>PV</b> , <b>I/Y</b> , <b>N</b> , <b>PMT</b> , <b>CPT</b> <b>FV</b>													
<p><b>Example C:</b> The future value of \$1 at 10 percent after three years is \$1.33. This amount is calculated as follows:</p>															
$\$1.33 = (\$1.00 + 0.10)^3$	Using Exhibit 1-A: $\$1.33 = \$1.00(1.33)$	1 <b>PV</b> , 10 <b>I/Y</b> , 3 <b>N</b> , 0 <b>PMT</b> , <b>CPT</b> <b>FV</b> 1.33													
<p>Future value tables are available to help you determine compounded interest amounts (see Exhibit 1-A on page 36). Looking at Exhibit 1-A for 10 percent and three years, you can see that \$1 would be worth \$1.33 at that time. For other amounts, multiply the table factor by the original amount. This process may be viewed as follows:</p>															
Future value (rounded)	<table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: right;">\$1</td> <td style="text-align: center;">\$1.10</td> <td style="text-align: center;">\$1.21</td> <td style="text-align: right;">FV = \$1.33</td> </tr> <tr> <td></td> <td style="text-align: center;">Interest \$0.10</td> <td style="text-align: center;">Interest \$0.11</td> <td style="text-align: center;">Interest \$0.12</td> </tr> <tr> <td style="text-align: right;">After year</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> </tr> </table>	\$1	\$1.10	\$1.21	FV = \$1.33		Interest \$0.10	Interest \$0.11	Interest \$0.12	After year	0	1	2	3	
\$1	\$1.10	\$1.21	FV = \$1.33												
	Interest \$0.10	Interest \$0.11	Interest \$0.12												
After year	0	1	2	3											

Formula	Table	Financial Calculator
<b>Example D:</b> If your savings of \$400 earns 12 percent, compounded <i>monthly</i> , over a year and a half, use the table factor for 1 percent for 18 time periods; the future value would be:		
\$478.46 = \$400(1 + 0.01) <sup>18</sup>	\$478.40 = \$400(1.196)	400 [PV], 12/12 = 1 [I/Y], 1.5 × 12 = 18 [N], 0 [PMT], [CPT] [FV] 478.46

### SAMPLE PROBLEM 3

What is the future value of \$800 at 8 percent after six years?

### SAMPLE PROBLEM 4

How much would you have in savings if you kept \$200 on deposit for eight years at 8 percent, compounded *semiannually*?

## Future Value of a Series of Equal Amounts (an Annuity)

Future value may also be calculated for a situation in which regular additions are made to savings. The formula and financial calculator computations are as follows:

Future Value of a Series of Payments		
Formula	Table	Financial Calculator
$FV = \text{Annuity} \frac{(1 + i)^n - 1}{i}$	Using Exhibit 1-B: Annuity × Table Factor	[PMT], [N], [I/Y], [PV], [CPT] [FV]
This calculation assumes that (1) each deposit is for the same amount, (2) the interest rate is the same for each time period, and (3) the deposits are made at the end of the each time period.		
$\$3.31 = \$1 \frac{(1 + 0.10)^3 - 1}{0.10}$	Using Exhibit 1-B: $\$3.31 = \$1 \times 3.31$	-1 [PMT], 3 [N], 10 [I/Y], 0 [PV], [CPT] [FV] 3.31
This may be viewed as follows:		
Future value (rounded)	<pre>     graph LR       A[Future value (rounded)] --&gt; B[Deposit \$1 Interest 0]       B --&gt; C[Deposit \$1 Interest \$0.10]       C --&gt; D[Deposit \$1 Interest \$0.21]       D --&gt; E[FV = \$3.31]       subgraph Timeline [ ]         B         C         D         E       end       B --&gt; F[After year 0]       C --&gt; G[1]       D --&gt; H[2]       E --&gt; I[3]     </pre>	\$3.31
<b>Example F:</b> If you plan to deposit \$40 a year for 10 years, earning 8 percent compounded annually, the future value of this amount is:		
$\$579.46 = \frac{\$40(1 + 0.08)^{10} - 1}{0.08}$	Using Exhibit 1-B $\$579.48 = \$40(14.487)$	-40 [PMT], 10 [N], 10 [I/Y], 0 [PV], [CPT] [FV] 579.46

### SAMPLE PROBLEM 5

What is the future value of an annual deposit of \$230 earning 6 percent for 15 years?

### SAMPLE PROBLEM 6

What amount would you have in a retirement account if you made annual deposits of \$375 for 25 years earning 12 percent, compounded annually?

## Present Value of a Single Amount

If you want to know how much you need to deposit now to receive a certain amount in the future, the formula and financial calculator computations are as follows:

<b>Present Value of a Single Amount</b>		
<b>Formula</b>	<b>Table</b>	<b>Financial Calculator</b>
$PV = \frac{FV}{(1 + i)^n}$	Using Exhibit 1-C: $PV = FV(\text{Table Factor})$	$FV$ , $N$ , $I/Y$ , $PMT$ , $CPT$ , $PV$
<b>Example G:</b> The present value of \$1 to be received three years from now based on a 10 percent interest rate is calculated as follows:		
$\$0.75 = \frac{\$1}{(1 + 0.10)^3}$	Using Exhibit 1-C: $\$0.75 = \$1(0.751)$	$1$ $FV$ , $3$ $N$ , $10$ $I/Y$ , $0$ $PMT$ , $CPT$ , $PV$ — $.75131$
This may be viewed as follows: <pre>     graph LR       A["Future value \$0.75 (rounded)"] --&gt; B["Discount (interest) \$0.075"]       B --&gt; C["Discount (interest) \$0.0825"]       C --&gt; D["Discount (interest) \$0.0905"]       D --&gt; E["\$1"]       A --- B       B --- C       C --- D       D --- E       A --- 0       B --- 1       C --- 2       D --- 3       E --- 3       style A fill:#f0e68c       style B fill:#f0e68c       style C fill:#f0e68c       style D fill:#f0e68c       style E fill:#f0e68c       style 0 fill:#f0e68c       style 1 fill:#f0e68c       style 2 fill:#f0e68c       style 3 fill:#f0e68c   </pre>		
Present value tables are available to assist you in this process (see Exhibit 1-C on page 38). Notice that \$1 at 10 percent for three years has a present value of \$0.75. For amounts other than \$1, multiply the table factor by the amount involved.		
<b>Example H:</b> If you want to have \$300 seven years from now and your savings earn 10 percent, compounded semiannually (which would be 5 percent for 14 time periods), finding how much you would have to deposit today is calculated as follows:		
$15\$151.52 = \frac{\$300}{(1 + 0.05)^{14}}$	Using Exhibit 1-C: $\$151.50 = \$300(0.505)$	$300$ $FV$ , $7 \times 2 = 14$ $N$ , $10/2 = 5$ $I/Y$ , $0$ $PMT$ , $CPT$ , $PV$ — $151.52$

### SAMPLE PROBLEM 7

What is the present value of \$2,200 earning 15 percent for eight years?

### SAMPLE PROBLEM 8

To have \$6,000 for a child's education in 10 years, what amount should a parent deposit in a savings account that earns 12 percent, compounded quarterly?

# Present Value of a Series of Equal Amounts (an Annuity)

The final time value of money situation allows you to receive an amount at the end of each time period for a certain number of periods. The formula and financial calculator computations are as follows:

Present Value of a Series of Payments														
Formula	Table	Financial Calculator												
$PV = \text{Annuity} \times \frac{1 - \frac{1}{(1 + i)^n}}{i}$	Using Exhibit 1-D: PV = Annuity(Table Factor)	<b>PMT</b> , <b>N</b> , <b>I/Y</b> , <b>FV</b> , <b>CPT</b> <b>PV</b>												
<b>Example I:</b> The present value of a \$1 withdrawal at the end of the next three years would be \$2.49, for money earning 10 percent. This would be calculated as follows:														
$\$2.49 = \$1 \left[ \frac{1 - \frac{1}{(1 + 0.10)^3}}{0.10} \right]$	Using Exhibit 1-D: $\$2.49 = \$1(2.487)$	<b>1</b> <b>PMT</b> , <b>3</b> <b>N</b> , <b>10</b> <b>I/Y</b> , <b>0</b> <b>FV</b> , <b>CPT</b> <b>PV</b> — 2.48685												
This may be viewed as follows: <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding-right: 10px;">Present value \$2.49</td> <td style="padding-right: 10px;">\$1.74</td> <td style="padding-right: 10px;">\$0.91</td> <td style="padding-right: 10px;">\$0</td> </tr> <tr> <td>(fund balance)</td> <td>Withdrawal – \$1</td> <td>Withdrawal – \$1</td> <td>Withdrawal – \$1</td> </tr> <tr> <td></td> <td>Interest + \$0.25</td> <td>Interest + \$0.17</td> <td>Interest + \$0.09</td> </tr> </table>			Present value \$2.49	\$1.74	\$0.91	\$0	(fund balance)	Withdrawal – \$1	Withdrawal – \$1	Withdrawal – \$1		Interest + \$0.25	Interest + \$0.17	Interest + \$0.09
Present value \$2.49	\$1.74	\$0.91	\$0											
(fund balance)	Withdrawal – \$1	Withdrawal – \$1	Withdrawal – \$1											
	Interest + \$0.25	Interest + \$0.17	Interest + \$0.09											
This same amount appears in Exhibit 1-D on page 39 for 10 percent and three time periods. To use the table for other situations, multiply the table factor by the amount to be withdrawn each year.														
<b>Example J:</b> If you wish to withdraw \$100 at the end of each year for 10 years from an account that earns 14 percent, compounded annually, what amount must you deposit now?														
$\$521.61 = \$100 \left( \frac{1 - \frac{1}{(1 + 0.14)^{10}}}{0.14} \right)$	Using Exhibit 1-D: $\$521.60 = \$100(5.216)$	<b>100</b> <b>PMT</b> , <b>10</b> <b>N</b> , <b>14</b> <b>I/Y</b> , <b>0</b> <b>FV</b> , <b>CPT</b> <b>PV</b> — 521.61156												

## SAMPLE PROBLEM 9

What is the present value of a withdrawal of \$200 at the end of each year for 14 years with an interest rate of 7 percent?

## SAMPLE PROBLEM 10

How much would you have to deposit now to be able to withdraw \$650 at the end of each year for 20 years from an account that earns 11 percent?

# Using Present Value to Determine Loan Payments

Present value tables can also be used to determine installment payments for a loan as follows:

Present Value to Determine Loan Payments	
Table	Financial Calculator
Amount borrowed Present value of a series table factor (Exhibit 1-D)	= Loan payment [PV] [I/Y] [N] [FV] [CPT] [PMT]
<b>Example K:</b> If you borrow \$1,000 with a 6 percent interest rate to be repaid in three equal payments at the end of the next three years, the payments will be \$374.11. This is calculated as follows:	
$\frac{\$1,000}{2.673} = \$374.11$	1000 [PV], 6 [I/Y], 3 [N], 0 [FV], [CPT] [PMT] - 374.10981

## SAMPLE PROBLEM 11

What would be the annual payment amount for a \$20,000, 10-year loan at 7 percent?

## Answers to Sample Problems

1.  $\$300 \times 0.06 \times 2.25 \text{ years (27 months)} = \$40.50.$
2.  $\$670 \times 0.12 \times 2/3 \text{ (of a year)} = \$53.60.$
3.  $\$800(1.587) = \$1,269.60.$  (Use Exhibit 1-A, 8%, 6 periods.)
4.  $\$200(1.873) = \$374.60.$  (Use Exhibit 1-A, 4%, 16 periods.)
5.  $\$230(23.276) = \$5,353.48.$  (Use Exhibit 1-B, 6%, 15 periods.)
6.  $\$375(133.33) = \$49,998.75.$  (Use Exhibit 1-B, 12%, 25 periods.)
7.  $\$2,200(0.327) = \$719.40.$  (Use Exhibit 1-C, 15%, 8 periods.)
8.  $\$6,000(0.307) = \$1,842.$  (Use Exhibit 1-C, 3%, 40 periods.)
9.  $\$200(8.745) = \$1,749.$  (Use Exhibit 1-D, 7%, 14 periods.)
10.  $\$650(7.963) = \$5,175.95.$  (Use Exhibit 1-D, 11%, 20 periods.)
11.  $\$20,000/7.024 = \$2,847.38.$  (Use Exhibit 1-D, 7%, 10 periods.)

## Time Value of Money Application Exercises

1. **(Present value of an annuity)** You wish to borrow \$18,000 to buy a new automobile. Rate is 8.6% over five years with monthly payments. Find monthly the payment. (Answer: \$444.52)
2. **(Present value of an annuity)** How much money must your rich uncle give you now to finance four years of college, assuming an annual cost of \$48,000 and an interest rate of 6% (applied to the principal until disbursed)? (Answer: \$166,325.07)
3. **(Present value of a single amount)** How much money must you set aside at age 20 to accumulate retirement funds of \$100,000 at age 65, assuming a rate of interest of 7%? (Answer: \$4,761.35)
4. **(Future value of a single amount)** If you deposit \$2,000 in a 5-year certificate of deposit at 5.2%, how much will it be worth in five years? (Answer: \$2,576.97)
5. **(Future value of a single amount)** If you deposit \$2,000 in a 5-year certificate of deposit at 5.2% with quarterly compounding, how much will it be worth in five years? (Answer: \$2,589.52)
6. **(Future value of an annuity)** You choose to invest \$50/month in a 401(k) that invests in an international stock mutual fund. Assuming an annual rate of return of 9%, how much will this fund worth if retiring in forty years? (Answer: \$234,066.01)
7. **(Future value of an annuity)** If, instead, you invest \$600/Year in a 401(k) that invests in an international stock mutual fund. Assuming an annual rate of return of 9%, how much will this fund worth if retiring in forty years? (Answer: \$202,729.47)

**Exhibit 1-A** Future value (compounded sum) of \$1 after a given number of time periods

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%
1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.100	1.110
2	1.020	1.040	1.061	1.082	1.103	1.124	1.145	1.166	1.188	1.210	1.232
3	1.030	1.061	1.093	1.125	1.158	1.191	1.225	1.260	1.295	1.331	1.368
4	1.041	1.082	1.126	1.170	1.216	1.262	1.311	1.360	1.412	1.464	1.518
5	1.051	1.104	1.159	1.217	1.276	1.338	1.403	1.469	1.539	1.611	1.685
6	1.062	1.126	1.194	1.265	1.340	1.419	1.501	1.587	1.677	1.772	1.870
7	1.072	1.149	1.230	1.316	1.407	1.504	1.606	1.714	1.828	1.949	2.076
8	1.083	1.172	1.267	1.369	1.477	1.594	1.718	1.851	1.993	2.144	2.305
9	1.094	1.195	1.305	1.423	1.551	1.689	1.838	1.999	2.172	2.358	2.558
10	1.105	1.219	1.344	1.480	1.629	1.791	1.967	2.159	2.367	2.594	2.839
11	1.116	1.243	1.384	1.539	1.710	1.898	2.105	2.332	2.580	2.853	3.152
12	1.127	1.268	1.426	1.601	1.796	2.012	2.252	2.518	2.813	3.138	3.498
13	1.138	1.294	1.469	1.665	1.886	2.133	2.410	2.720	3.066	3.452	3.883
14	1.149	1.319	1.513	1.732	1.980	2.261	2.579	2.937	3.342	3.797	4.310
15	1.161	1.346	1.558	1.801	2.079	2.397	2.759	3.172	3.642	4.177	4.785
16	1.173	1.373	1.605	1.873	2.183	2.540	2.952	3.426	3.970	4.595	5.311
17	1.184	1.400	1.653	1.948	2.292	2.693	3.159	3.700	4.328	5.054	5.895
18	1.196	1.428	1.702	2.026	2.407	2.854	3.380	3.996	4.717	5.560	6.544
19	1.208	1.457	1.754	2.107	2.527	3.026	3.617	4.316	5.142	6.116	7.263
20	1.220	1.486	1.806	2.191	2.653	3.207	3.870	4.661	5.604	6.727	8.062
25	1.282	1.641	2.094	2.666	3.386	4.292	5.427	6.848	8.623	10.835	13.585
30	1.348	1.811	2.427	3.243	4.322	5.743	7.612	10.063	13.268	17.449	22.892
40	1.489	2.208	3.262	4.801	7.040	10.086	14.974	21.725	31.409	45.259	65.001
50	1.645	2.692	4.384	7.107	11.467	18.420	29.457	46.902	74.358	117.390	184.570

Period	12%	13%	14%	15%	16%	17%	18%	19%	20%	25%	30%
1	1.120	1.130	1.140	1.150	1.160	1.170	1.180	1.190	1.200	1.250	1.300
2	1.254	1.277	1.300	1.323	1.346	1.369	1.392	1.416	1.440	1.563	1.690
3	1.405	1.443	1.482	1.521	1.561	1.602	1.643	1.685	1.728	1.953	2.197
4	1.574	1.630	1.689	1.749	1.811	1.874	1.939	2.005	2.074	2.441	2.856
5	1.762	1.842	1.925	2.011	2.100	2.192	2.288	2.386	2.488	3.052	3.713
6	1.974	2.082	2.195	2.313	2.436	2.565	2.700	2.840	2.986	3.815	4.827
7	2.211	2.353	2.502	2.660	2.826	3.001	3.185	3.379	3.583	4.768	6.276
8	2.476	2.658	2.853	3.059	3.278	3.511	3.759	4.021	4.300	5.960	8.157
9	2.773	3.004	3.252	3.518	3.803	4.108	4.435	4.785	5.160	7.451	10.604
10	3.106	3.395	3.707	4.046	4.411	4.807	5.234	5.696	6.192	9.313	13.786
11	3.479	3.836	4.226	4.652	5.117	5.624	6.176	6.777	7.430	11.642	17.922
12	3.896	4.335	4.818	5.350	5.936	6.580	7.288	8.064	8.916	14.552	23.298
13	4.363	4.898	5.492	6.153	6.886	7.699	8.599	9.596	10.699	18.190	30.288
14	4.887	5.535	6.261	7.076	7.988	9.007	10.147	11.420	12.839	22.737	39.374
15	5.474	6.254	7.138	8.137	9.266	10.539	11.974	13.590	15.407	28.422	51.186
16	6.130	7.067	8.137	9.358	10.748	12.330	14.129	16.172	18.488	35.527	66.542
17	6.866	7.986	9.276	10.761	12.468	14.426	16.672	19.244	22.186	44.409	86.504
18	7.690	9.024	10.575	12.375	14.463	16.879	19.673	22.091	26.623	55.511	112.460
19	8.613	10.197	12.056	14.232	16.777	19.748	23.214	27.252	31.948	69.389	146.190
20	9.646	11.523	13.743	16.367	19.461	23.106	27.393	32.429	38.338	86.736	190.050
25	17.000	21.231	26.462	32.919	40.874	50.658	62.669	77.388	95.396	264.700	705.640
30	29.960	39.116	50.950	66.212	85.850	111.070	143.370	184.680	237.380	807.790	2,620.000
40	93.051	132.780	188.880	267.860	378.720	533.870	750.380	1,051.700	1,469.800	7,523.200	36,119.000
50	289.000	450.740	700.230	1,083.700	1,670.700	2,566.200	3,927.400	5,998.900	9,100.400	70,065.000	497,929.000

**Exhibit 1-B** Future value (compounded sum) of \$1 paid in at the end of each period of a given number of time periods (an annuity)

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.010	2.020	2.030	2.040	2.050	2.060	2.070	2.080	2.090	2.100	2.110
3	3.030	3.060	3.091	3.122	3.153	3.184	3.215	3.246	3.278	3.310	3.342
4	4.060	4.122	4.184	4.246	4.310	4.375	4.440	4.506	4.573	4.641	4.710
5	5.101	5.204	5.309	5.416	5.526	5.637	5.751	5.867	5.985	6.105	6.228
6	6.152	6.308	6.468	6.633	6.802	6.975	7.153	7.336	7.523	7.716	7.913
7	7.214	7.434	4.662	7.898	8.142	8.394	8.654	8.923	9.200	9.487	9.783
8	8.286	8.583	8.892	9.214	9.549	9.897	10.260	10.637	11.028	11.436	11.859
9	9.369	9.755	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579	14.164
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937	16.722
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531	19.561
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384	22.713
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523	26.212
14	14.947	15.974	17.086	18.292	19.599	21.015	22.550	24.215	26.019	27.975	30.095
15	16.097	17.293	18.599	20.024	21.579	23.276	25.129	27.152	29.361	31.772	34.405
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003	35.950	39.190
17	18.430	20.012	21.762	23.698	25.840	20.213	30.840	33.750	36.974	40.545	44.501
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301	45.599	50.396
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.159	56.939
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160	57.275	64.203
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347	114.410
30	34.785	40.588	47.575	56.085	66.439	79.058	94.461	113.280	136.310	164.490	199.020
40	48.886	60.402	75.401	95.026	120.800	154.760	199.640	259.060	337.890	442.590	581.830
50	64.463	84.579	112.800	152.670	209.350	290.340	406.530	573.770	815.080	1,163.900	1,668.800

Period	12%	13%	14%	15%	16%	17%	18%	19%	20%	25%	30%
1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
2	2.120	2.130	2.140	2.150	2.160	2.170	2.180	2.190	2.200	2.250	2.300
3	3.374	3.407	3.440	3.473	3.506	3.539	3.572	3.606	3.640	3.813	3.990
4	4.779	4.850	4.921	4.993	5.066	5.141	5.215	5.291	5.368	5.766	6.187
5	6.353	6.480	6.610	6.742	6.877	7.014	7.154	7.297	7.442	8.207	9.043
6	8.115	8.323	8.536	8.754	8.977	9.207	9.442	9.683	9.930	11.259	12.756
7	10.089	10.405	10.730	11.067	11.414	11.772	12.142	12.523	12.916	15.073	17.583
8	12.300	12.757	13.233	13.727	14.240	14.773	15.327	15.902	16.499	19.842	23.858
9	14.776	15.416	16.085	16.786	17.519	18.285	19.086	19.923	20.799	25.802	32.015
10	17.549	18.420	19.337	20.304	21.321	22.393	23.521	24.701	25.959	33.253	42.619
11	20.655	21.814	23.045	24.349	25.733	27.200	28.755	30.404	32.150	42.566	56.405
12	24.133	25.650	27.271	29.002	30.850	32.824	34.931	37.180	39.581	54.208	74.327
13	28.029	29.985	32.089	34.352	36.786	39.404	42.219	45.244	48.497	68.760	97.625
14	32.393	34.883	37.581	40.505	43.672	47.103	50.818	54.841	59.196	86.949	127.910
15	37.280	40.417	43.842	47.580	51.660	56.110	60.965	66.261	72.035	109.690	167.290
16	42.753	46.672	50.980	55.717	60.925	66.649	72.939	79.850	87.442	138.110	218.470
17	48.884	53.739	59.118	65.075	71.673	78.979	87.068	96.022	105.930	173.640	285.010
18	55.750	61.725	68.394	75.836	84.141	93.406	103.740	115.270	128.120	218.050	371.520
19	63.440	70.749	78.969	88.212	98.603	110.290	123.410	138.170	154.740	273.560	483.970
20	72.052	80.947	91.025	102.440	115.380	130.030	146.630	165.420	186.690	342.950	630.170
25	133.330	155.620	181.870	212.790	249.210	292.110	342.600	402.040	471.980	1,054.800	2,348.800
30	241.330	293.200	356.790	434.750	530.310	647.440	790.950	966.700	1,181.900	3,227.200	8,730.000
40	767.090	1,013.700	1,342.000	1,779.100	2,360.800	3,134.500	4,163.210	5,529.800	7,343.900	30,089.000	120,393.000
50	2,400.000	3,459.500	4,994.500	7,217.700	10,436.000	15,090.000	21,813.000	31,515.000	45,497.000	80,256.000	165,976.000

**Exhibit 1-C** Present value of \$1 to be received at the end of a given number of time periods

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	0.812	0.797
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	0.731	0.712
4	0.961	0.924	0.885	0.855	0.823	0.792	0.763	0.735	0.708	0.683	0.659	0.636
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	0.593	0.567
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	0.535	0.507
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	0.482	0.452
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	0.434	0.404
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	0.391	0.361
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	0.352	0.322
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350	0.317	0.287
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	0.286	0.257
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	0.258	0.229
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	0.232	0.205
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	0.209	0.183
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218	0.188	0.163
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198	0.170	0.146
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180	0.153	0.130
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164	0.138	0.116
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149	0.124	0.104
25	0.780	0.610	0.478	0.375	0.295	0.233	0.184	0.146	0.116	0.092	0.074	0.059
30	0.742	0.552	0.412	0.308	0.231	0.174	0.131	0.099	0.075	0.057	0.044	0.033
40	0.672	0.453	0.307	0.208	0.142	0.097	0.067	0.046	0.032	0.022	0.015	0.011
50	0.608	0.372	0.228	0.141	0.087	0.054	0.034	0.021	0.013	0.009	0.005	0.003

**Exhibit 1-D** Present value of \$1 received at the end of each period for a given number of time periods (an annuity)

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	0.901	0.893
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.713	1.690
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.444	2.402
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.102	3.037
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.696	3.605
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	4.231	4.111
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	4.712	4.564
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	5.146	4.968
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.537	5.328
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.889	5.650
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	6.207	5.938
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.492	6.194
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103	6.750	6.424
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367	6.982	6.628
15	13.865	12.849	11.939	11.118	10.380	9.712	9.108	8.559	8.061	7.606	7.191	6.811
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824	7.379	6.974
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.549	7.102
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201	7.702	7.250
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365	7.839	7.366
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.818	9.129	8.514	7.963	7.469
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.823	9.077	8.422	7.843
30	25.808	22.396	19.600	17.292	15.372	13.765	12.409	11.258	10.274	9.427	8.694	8.055
40	32.835	27.355	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.779	8.951	8.244
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.962	9.915	9.042	8.304

Period	13%	14%	15%	16%	17%	18%	19%	20%	25%	30%	35%	40%	50%
1	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833	0.800	0.769	0.741	0.714	0.667
2	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528	1.440	1.361	1.289	1.224	1.111
3	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106	1.952	1.816	1.696	1.589	1.407
4	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589	2.362	2.166	1.997	1.849	1.605
5	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991	2.689	2.436	2.220	2.035	1.737
6	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326	2.951	2.643	2.385	2.168	1.824
7	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605	3.161	2.802	2.508	2.263	1.883
8	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837	3.329	2.925	2.598	2.331	1.922
9	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031	3.463	3.019	2.665	2.379	1.948
10	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192	3.571	3.092	2.715	2.414	1.965
11	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327	3.656	3.147	2.752	2.438	1.977
12	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439	3.725	3.190	2.779	2.456	1.985
13	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533	3.780	3.223	2.799	2.469	1.990
14	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611	3.824	3.249	2.814	2.478	1.993
15	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675	3.859	3.268	2.825	2.484	1.995
16	6.604	6.265	5.954	5.668	5.405	5.162	4.938	4.730	3.887	3.283	2.834	2.489	1.997
17	6.729	6.373	6.047	5.749	5.475	5.222	4.988	4.775	3.910	3.295	2.840	2.492	1.998
18	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812	3.928	3.304	2.844	2.494	1.999
19	6.938	6.550	6.198	5.877	5.584	5.316	5.070	4.843	3.942	3.311	2.848	2.496	1.999
20	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870	3.954	3.316	2.850	2.497	1.999
25	7.330	6.873	6.464	6.097	5.766	5.467	5.195	4.948	3.985	3.329	2.856	2.499	2.000
30	7.496	7.003	6.566	6.177	5.829	5.517	5.235	4.979	3.995	3.332	2.857	2.500	2.000
40	7.634	7.105	6.642	6.233	5.871	5.548	5.258	4.997	3.999	3.333	2.857	2.500	2.000
50	7.675	7.133	6.661	6.246	5.880	5.554	5.262	4.999	4.000	3.333	2.857	2.500	2.000